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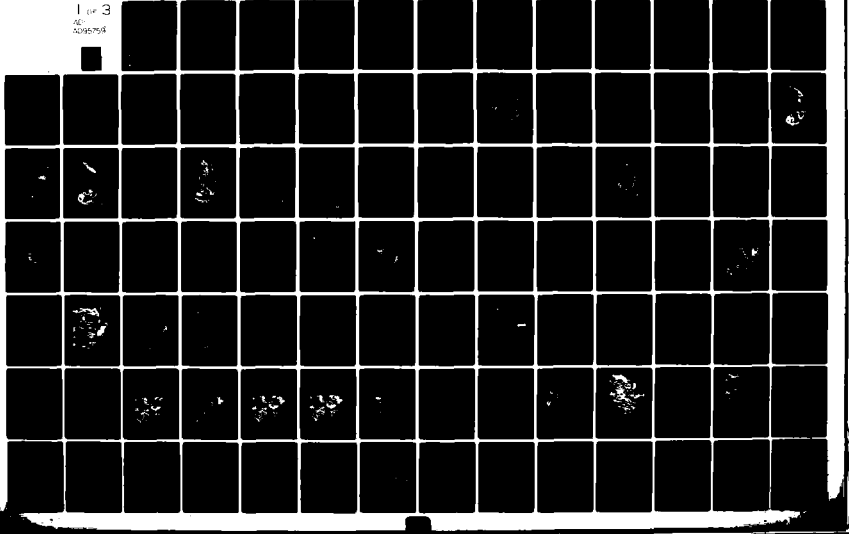

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M-X
ENVIRONMENTAL
TECHNICAL REPORT

ETR 1
LOCATIONAL ALTERNATIVES

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This Environmental Technical Report describes the process and criteria used to identify suitable locational alternatives for further analysis in the M-X Deployment Area Section and Land Withdrawal/Acquisition EIS. During the screening process, which began in 1977, geotechnical, cultural, and environmental criteria narrowed the Continential United States, down to six suitable regions located in the Southwest. Refined criteria which considered military and operational factors were used to reevaluate those six regions. Of the six, only two were identified as having suitable land for M-X deployment. (OVER)

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The first is the Great Basin region of Nevada/Utah roughly bounded by Las Vegas, Tonopah and Ely, Nevada and Delta, Utah. The seond region is the portion of the High Plains in the vicinity of Clovis, New Mexico and Dalhart, Texas. Information collected to date indicates Nevad/Utah is the preferred area for M-X in MPS.

Potential suitability zones for siting operating base complexes were identified for both siting regions concurrently with selection of the deployment area zones.

Two operating bases (OB) are required to support the M-X system regardless of which deployment alternative is selected.

M-X-ETR-1

SELECTION OF SUITABLE LOCATIONAL ALTERNATIVES

December, 1980

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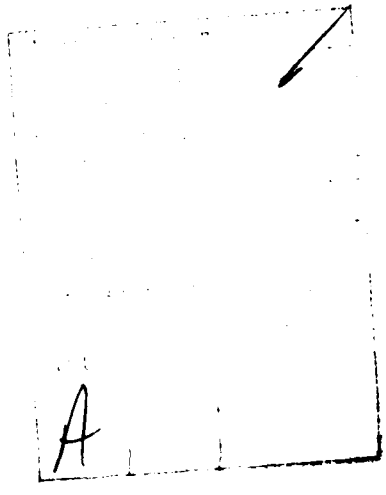

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ABSTRACT

The continuing Soviet ICBM buildup is making our silo based Minuteman force increasingly vulnerable. In response, the Air Force has proposed that a new mobile missile system known as M-X be deployed in a multiple protective shelter (MPS) basing mode to maintain ICBM survivability and strengthen our strategic deterrent forces. The Department of Defense considers M-X in MPS its highest priority defense program, and the Administration and Congress have confirmed its national importance and criticality of the schedule.

This Environmental Technical Report describes the process and criteria used to identify suitable locational alternatives for further analysis in the M-X Deployment Area Section and Land Withdrawal/ Acquisition EIS. During the screening process, which began in 1977, geotechnical, cultural, and environmental criteria narrowed the Continental United States, down to six suitable regions located in the Southwest. Refined criteria which considered military and operational factors were used to reevaluate those six regions. Of the six, only two were identified as having suitable land for M-X deployment. The first is the Great Basin region of Nevada/Utah roughly bounded by Las Vegas, Tonopah and Ely, Nevada and Delta, Utah. The second region is the portion of the High Plains in the vicinity of Clovis, New Mexico and Dalhart, Texas. Information collected to date indicates Nevada/Utah is the preferred area for M-X in MPS.

Separate sets of criteria were applied to define suitability zones for the designated deployment areas (which could accommodate 4,600 shelters, roads, and facilities) and operating base locations. The objectives of the criteria were to select zones in which the M-X system could be deployed at minimum cost and meet operational requirements, coexist with local activities, and cause least disturbance to human and natural (biophysical) environments.

Full basing of all 4,600 shelters in a single region requires about two-thirds of the suitable area in Nevada, Utah and almost all of the suitable area in Texas/New Mexico. Split basing would deploy approximately 2,300 shelters in each region thereby reducing area requirements in each region by 50 percent.

The southern and eastern portion of the Nevada/Utah region was selected for full deployment in the Proposed Action alternative as it contained the highest density of suitable land, minimized transportations costs, avoided private land, has the most favorable weather conditions, and is closest to operating base suitability zones. The central portion of this full basing suitability zone was selected for the split basing option in Nevada/Utah for the same reasons.

Almost all of the suitable Texas/New Mexico area was selected for the full basing alternative in this region. The western portion of this full basing zone was selected for the Texas/New Mexico split basing alternative as this portion would offer the minimum interference with irrigated agriculture and minimum relocation of people.

Potential suitability zones for siting operating base complexes were identified for both siting regions concurrently with selection of the deployment area zones. Application of detailed siting critieria resulted in identification of the following OB suitability zones in the vicinities of the following locations:

NEVADA/UTAH

- Coyote Spring Valley, Nevada
- Ely, Nevada
- Beryl, Utah
- Delta, Utah
- Milford, Utah

TEXAS/NEW MEXICO

- Clovis, New Mexico
- Dalhart, Texas

Two operating bases (OB) are required to support the M-X system regardless of which deployment alternative is selected.

After review of 42 pairs of OB/DDA combinations, the system deployment alternatives listed on the next page were selected for further consideration and analysis in the EIS. Each alternative includes suitability zones for a designated deployment area (or areas, for split basing), and two operating bases.

PROPOSED ACTION AND ALTERNATIVES	DEPLOYMENT AREAS[1]				OPERATING BASE VICINITIES	
	NEVADA	UTAH	TEXAS	NEW MEXICO	FIRST	SECOND
Proposed Action						
Nevada/Utah, Full Deployment	200		0	0	Coyote Spring Valley, NV	Milford, UT
Full Deployment Alternatives						
1. Nevada/Utah	200		0	0	Coyote Spring Valley, NV	Beryl, UT
2. Nevada/Utah	200		0	0	Coyote Spring Valley, NV	Delta, UT
3. Nevada/Utah	200		0	0	Beryl, UT	Ely, NV
4. Nevada/Utah	200		0	0	Beryl, UT	Coyote Spring Valley, NV
5. Nevada/Utah	200		0	0	Milford, UT	Ely, NV
6. Nevada/Utah	200		0	0	Milford, UT	Coyote Spring Valley, NV
7. Texas/New Mexico	0	0	200		Clovis, NM	Dalhart, TX
Split Basing Alternative						
8. Nevada/Utah-Texas/New Mexico	100		100		Coyote Spring Valley, NV	Clovis, NM
No Action Alternative	NA			NA	NA	NA

3623-3

[1]The numbers represent missiles deployed (approximate for split basing).

1.0 INTRODUCTION

1.1 BACKGROUND

The potential need for a new survivable land based intercontinental ballistic missile (ICBM) was recognized in the early 1960s. At that time our ICBMs were being deployed in relatively invulnerable fixed silos which are still being used today for the Minuteman and Titan strategic missiles. Since the 1960s a significant military build-up of the Soviet ICBM force has occurred. Advancement in Soviet ICBM technology coupled with increases in numbers of weapons will soon be sufficient to place any fixed target at risk, including fixed silos. During the past two decades various survivable basing mode concepts were considered, and the studies became more intense as the threat to our ICBMs became more real.

The Strategic Air Command officially documented the requirement for an advanced, survivable ICBM in 1971, and the M-X program began in 1974. The purpose of the M-X missile system is to improve the survivability and capability of our land-based ICBM force thus continuing to help deter a Soviet attack against the United States.

The Air Force has concluded that ICBM survivability can best be achieved by deploying mobile missiles in a multiple protective shelter (MPS) system.

The M-X is a new mobile missile which will be assembled at a small centralized facility and is designed for horizontal movement. A relatively few missiles will be hidden among a large number of garage-like structures. Transported by a large vehicle, the missile and its launcher will move infrequently because of their very low expected failure rates. The facilities for housing and maintaining deployed missiles will normally be unmanned. When required, maintenance and security personnel will travel from a few small support centers located throughout the missile basing area. The majority of the people required to operate and support the system will be located at two bases, each resembling a small community.

The M-X concept is technically feasible, affordable, and preserves unique features traditionally provided by ICBMs. These features include survivability; quick flexible response; independence from warning; high alert rate; dependable command, control, and communications; and low operating cost.

The M-X system is designed to strengthen our strategic forces so that no nation would be tempted to initiate an attack against the United States. Should an aggressor attack the M-X missile in a MPS system, he would face an adverse exchange ratio; the attacker would be forced to use more of his weapons than the number of weapons he could expect to

destroy. Thus, a rational enemy, if starting from a position of near parity, would be deterred from attacking preemptively because the relative balance of force would be shifted against him. This is the essence of deterrence and the fundamental reason why M-X is needed.

The Department of Defense considers M-X in MPS its highest priority defense program, and the Administration and Congress have confirmed its national importance and the criticality of the schedule. Accordingly, the Air Force is proposing to deploy 200 M-X missiles, 4,600 protective structures supported by two operating bases in the southwestern United States.

As required by the National Environmental Policy Act and DOD Directive 6050.1, the Air Force is preparing a Draft Environmental Impact Statement on Deployment Area Selection and Land Withdrawal/Land Acquisition. This report described the process by which the Proposed Action and alternatives were selection for analysis.

1.2 SYSTEMS APPROACH TO SITING THE M-X MISSILE SYSTEM

In September 1979, the President of the United States confirmed the five essential criteria that had been established for basing the M-X Missile System -- criteria that the system must satisfy wherever it is based -- in the following statement:

> "At the time that I made the decision to build the M-X, I established five essential criteria which the basic system would have to meet. First, it must contribute to the ability of the strategic forces to survive an attack. Second, it must be verifiable so as to set a standard which can serve as a precedent for the verifiability of mobile ICBM systems on both sides. Third, it must minimize the adverse impact on our own environment. Fourth, its deployment must be at a reasonable cost to the American taxpayer. And fifth, it must be consistent with existing SALT agreements and with SALT II goals of negotiating for significant mutual reductions in strategic forces."

Congress has also recognized the need for M-X in multiple protective shelters (MPS) and its urgency. While Congressional action has clearly shown concern for minimizing adverse economic and environmental impacts, it has also emphasized the importance of the system and the need to deploy it as early as possible. The Department of Defense Supplemental Appropriation Authorization Act, 1979, contained the following:

> "Sec. 202. (a) It is the sense of the Congress that maintaining a survivable land-based intercontinental ballistic missile system is vital to the security of the United States and that development of a new basing mode for land-based intercontinental ballistic missiles is necessary to assure the survivability of the land-based system. To this end, the development of the M-X missile,

together with a new basing mode for such missile, should proceed so as to achieve initial operational capability (IOC) for both such missile and such basing mode at the earliest practicable date."

Deploying the M-X missile in the multiple protective structure (MPS) basing configuration to meet these objectives requires siting the following major groups of interrelated facilities shown in Figure 1-1.

- The designated deployment area (DDA) complex -- this is the well-defined area or areas in which the 200 missiles are deployed on their mobile launchers, with each confined to a cluster of 23 protective shelters with a maintenance facility and interconnecting roads. It includes area support centers for maintenance, security, and operational personnel and their equipment; a radar surveillance system; an electrical power distribution system and standby supplies; elements of the command, control, and communications system; the operational base test site (OBTS) and adjacent framing facilities; service roads; and other support facilities.

- The operating base (OB) complexes, including living, working, and recreational areas; an airfield; storage and other support areas; and (for one base, or two with split basing) a designated assembly area (DAA) for missile and launcher assembly and major repair in a well-defined, observable, area or areas.

- A unique, observable roadway, the designated transportation network (DTN), that contributes the only means for transporting missiles or (for initial deployment only) launchers between the DAA and the clusters. (There may be two DAAs and thus two DTNs for split basing.)

The primary objective of survivability is assured by the numbers, design, and spacing of the protective shelters. Their spacing and hardness is such that more than one of them cannot be destroyed by a single weapon. The number of shelters and their design, spacing and hardness establish the basic requirements for the type and amount of land required. These basic requirements were used to screen the entire continental United States to locate areas with suitable geotechnical and tophographic characteristics for deployment. Screening also eliminated cultural and environmental features such as population centers, parks, Indian Reservations, and other restricted-use areas. The remaining area was then evaluated for military and operational suitability, which eliminated all but two viable deployment areas, Nevada/Utah and Texas/ New Mexico. Section 2 describes this criteria-screening and military-evaluation process.

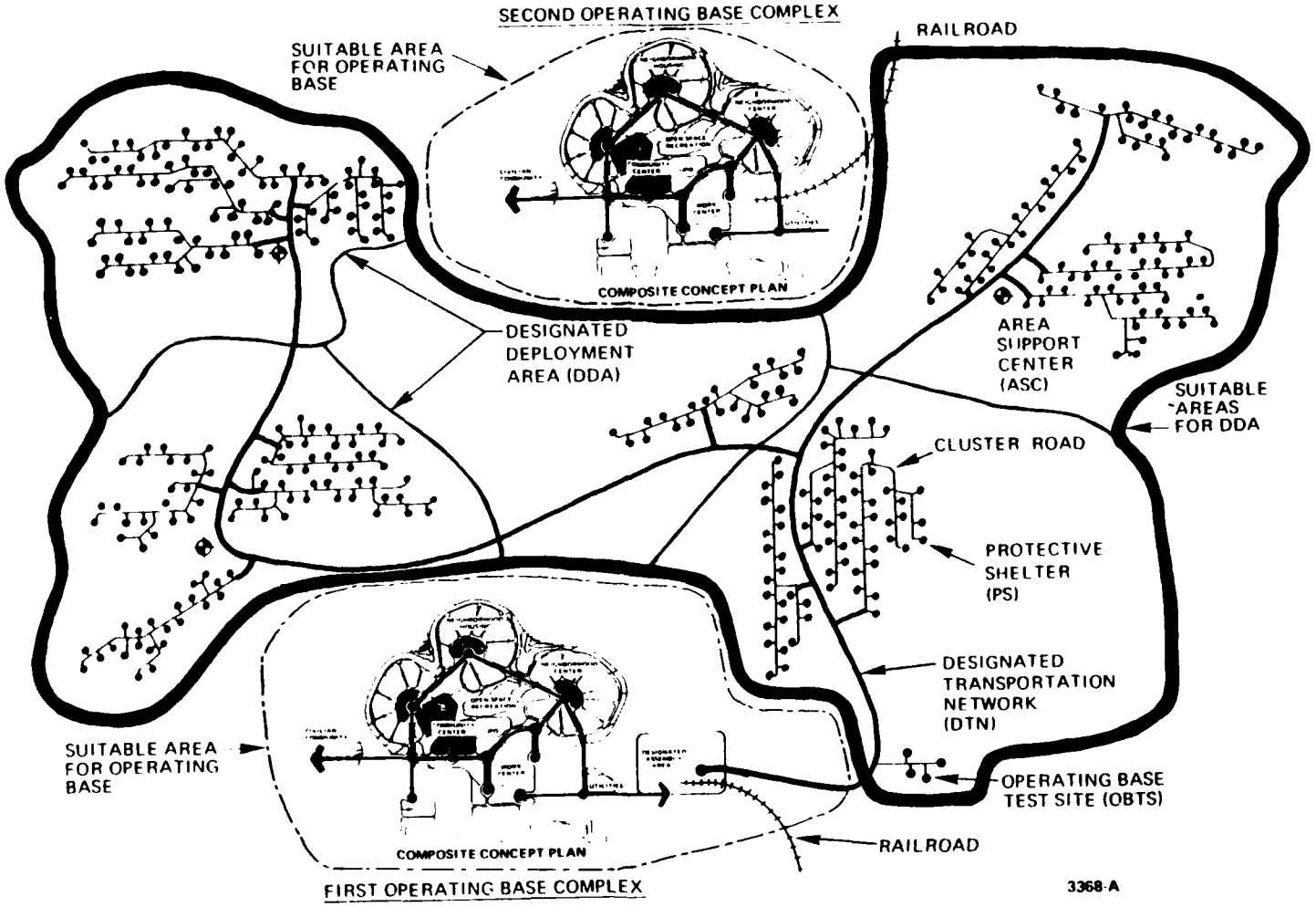

Figure 1-1. Conceptual M-X system facilities.

Siting requires consideration of the overall system. All system elements shown in Figure 1-1 were considered in each siting study layout, as each must have the proper relationships to other elements as well as satisfy its particular detailed siting criteria. For example, each shelter location is constrained by the location of others in its vicinity; area support center locations are constrained by location of clusters; and the DTN and operating base complexes are constrained by the location of the clusters and routes for the DTN.

The way in which system layouts were generated is indicated on the flow chart, Figure 1-2. The DDA considerations along with the OB siting requirements were used to develop preliminary system layouts. These were then used to establish construction plans, and personnel and material requirements, which, together with environmental exclusions, permitted development of refined layouts.

From these analyses, the DDA suitability zones shown in the DEIS were selected as the most compact ones possible that could be supported from potential OB sites with an acceptable DTN route that avoided sensitive environmental features. The zones shown in the DEIS constitute the areas that would be selected in the Tier 1 decision described in Section 1.7 of that document. Conceptual layouts, including the ones in the DEIS, will not be used to decide irrevocably the site of each individual facility or the OB sites within the corresponding suitability zones. These decisions will follow further site-specific analyses in subsequent tiers.

Detailed descriptions of the development of DDA and OB suitability zones are given in Section 3 and 4 respectively, with the rationale for selection of the Proposed Action and alternatives following in Chapters 5 and 6.

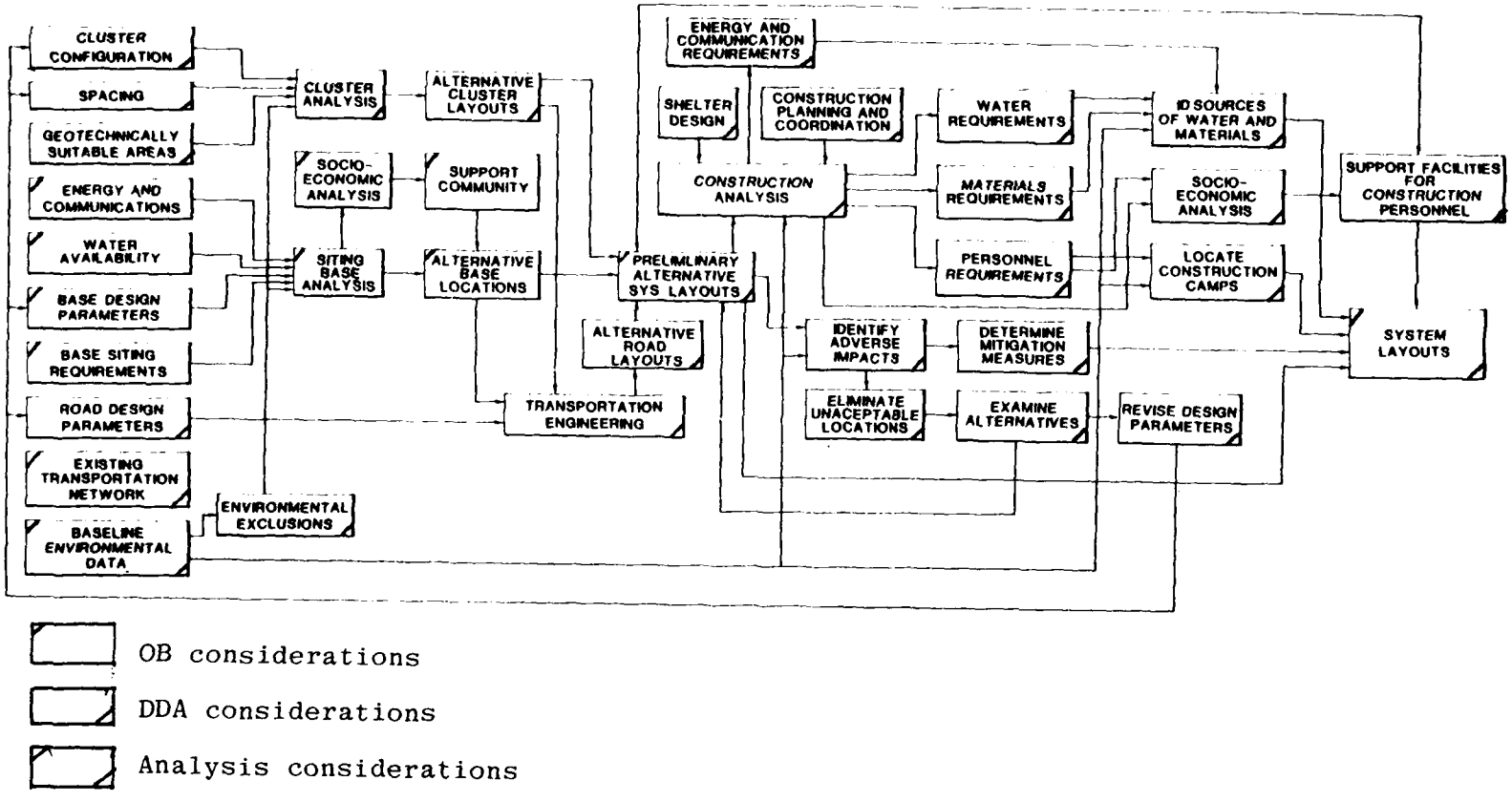

Figure 1-2. Flowchart for M-X system layouts.

2.0 SUITABLE DEPLOYMENT STATES

This section describes the process by which areas suitable for deployment of the M-X system were determined. The process resulted in identification of contiguous areas in the states of Nevada and Utah, and in Texas and New Mexico as suitable for deploying the entire system (200 missiles). It is also possible to deploy approximately one-half of the system in Nevada and Utah, and the other one-half in Texas and New Mexico ("split basing").

The process of identifying areas suitable for deployment within the entire conterminous United States (the 48 adjacent states) began in 1977 with a sequence of studies based on existing data (publications and maps), and multi-stage screening process termed coarse, intermediate, and fine screening. These early studies were aimed at identifying areas that were suitable for deployment of the M-X system either in buried trenches or in horizontal shelters of a style somewhat different from the one currently under consideration.

The areas defined by coarse and intermediate screening are referred to as "geotechnically suitable" areas, although they are not based exclusively on technical characteristics but include cultural and population-related exclusions as well. They are based on exclusionary criteria; an area that did not meet criteria during screening was excluded from further consideration.

Subsequent to the screening process, which defined the geotechnically suitable areas, detailed consideration was given to operational and other factors which would influence long-term system survivability of the M-X system and general compatibility with the siting region. This "narrowing" process resulted in further elimination of the suitable areas to the states currently under consideration.

2.1 SCREENING FOR PROTECTIVE STRUCTURE SUITABILITY

COARSE SCREENING (2.1.1)

Coarse screening was designed to identify the areas of the conterminous United States that are unsuitable for M-X deployment as rapidly and inexpensively as possible. These areas were deleted from further consideration, and attention focused on the remaining areas which may be suitable.

Coarse screening involved collection and analysis of published and unpublished data, evaluation with respect to the suitability criteria, and exclusion of areas which clearly did not meet the criteria. No field work was performed in this phase.

Screening Criteria (2.1.1.1)

The criteria applied in coarse screening and the corresponding results follow:

ROCK OCCURRENCE. Areas with surface rock, and with rock within a nominal 50 ft of the surface, were excluded to permit construction of the system at an acceptable cost. For this purpose, rock was defined as earth material that is not rippable by conventional excavation methods. Where seismic data were available, rock was defined as material with a compressional-wave velocity greater than 7,000 ft/sec.

Figure 2.1.1.1-1 shows the areas excluded by this criterion. Of the approximate 3.0 million sq mi of area in the 48 adjacent states, 0.7 million were definitely unsuitable, 1.9 million were suitable, and 0.4 million were potentially suitable but inadequately defined by the available data on hard rock. The largest exclusions were in the mountainous areas of the United States.

WATER OCCURRENCE. Areas with surface water, and with groundwater within a nominal 50 ft of the surface, were excluded to minimize both construction (dewatering) and operating (pumping) costs. Surface water included all significant lakes, reservoirs, swamps, and major perennial streams. Areas were considered unacceptable if water would be encountered in an excavation 50 ft deep.

Figure 2.1.1.1-2 shows the areas affected by this criterion, and the corresponding amounts of suitable, potentially suitable, and unsuitable area. Relatively little area (280,000 sq mi) was definitively excluded, and an additional 300,000 sq mi was potentially excluded (or suitable) with the uncertainty caused by inadequate data.

TOPOGRAPHIC. Areas with slopes of greater than 10 percent (1 ft rise in 10 ft, or approximately 5.7 degrees) were excluded both to permit system mobility and to avoid costly and disruptive construction on steep slopes. Figure 2.1.1.1-3 shows the areas affected by this criterion, which predominantly fell in the regions which are also excluded by rock.

CULTURAL AND POPULATION STANDOFF. All land within significant federal and state forests, parks, monuments, recreation areas, wildlife refuges, preserves, and management areas was excluded. Indian reservations were also excluded. These cultural exclusions were made at an early stage to prevent encroachment of the system into areas incompatible with co-use.

Areas within 20.7 mi of cities having 1970 populations of 25,000 or more, and within 3.5 mi of cities with populations between 5,000 and 25,000 were also excluded, to minimize possible future co-use conflicts. The criteria were originally established in nautical miles (6,076.1 ft vs ordinary or statute miles (5,280 ft); values converted to statute miles are given here. The most recent available population data vs 1970 census data, is also being used in current analysis.

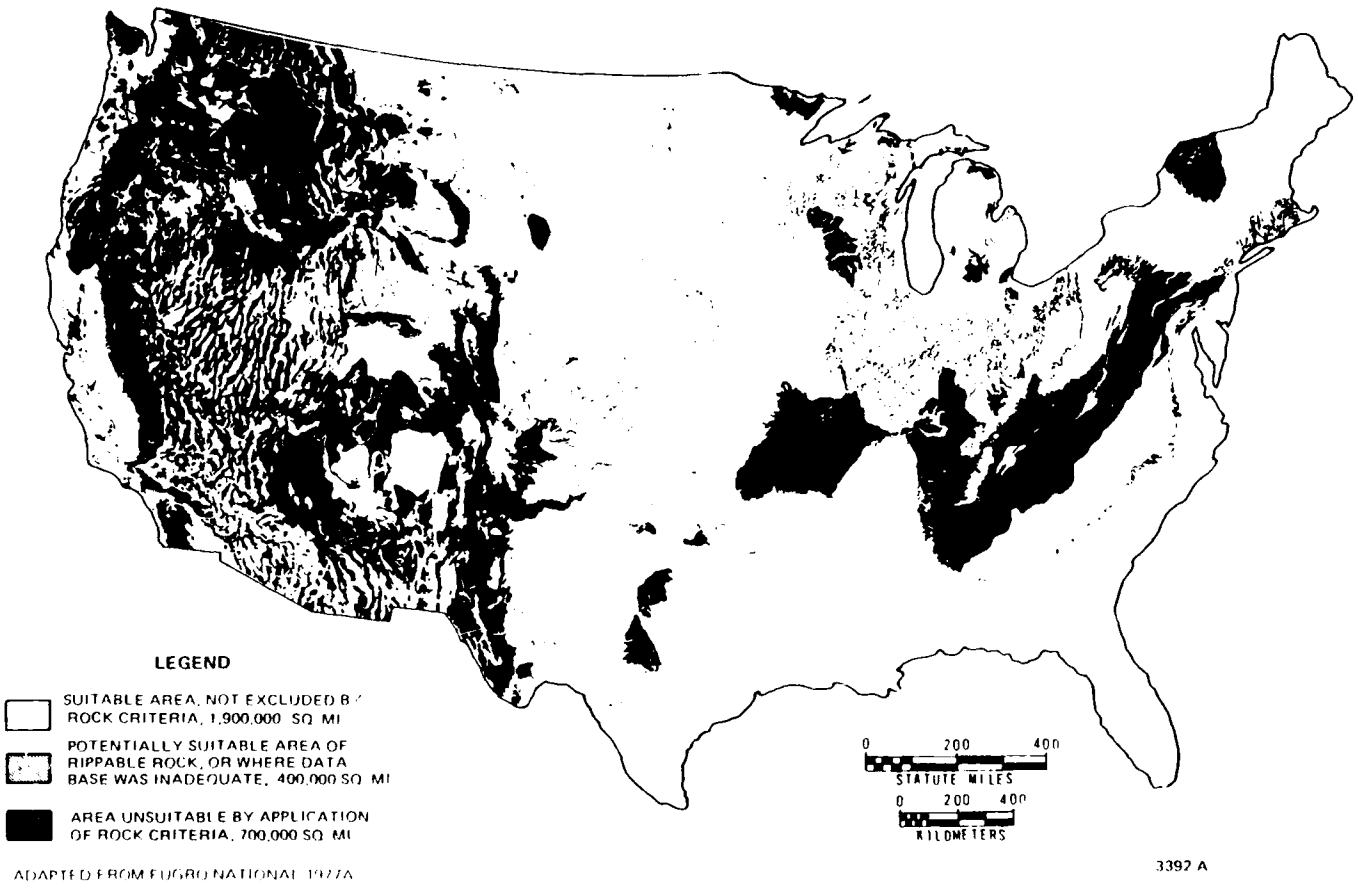

Figure 2.1.1.1-1. Area excluded by depth to rock -- coarse screening.

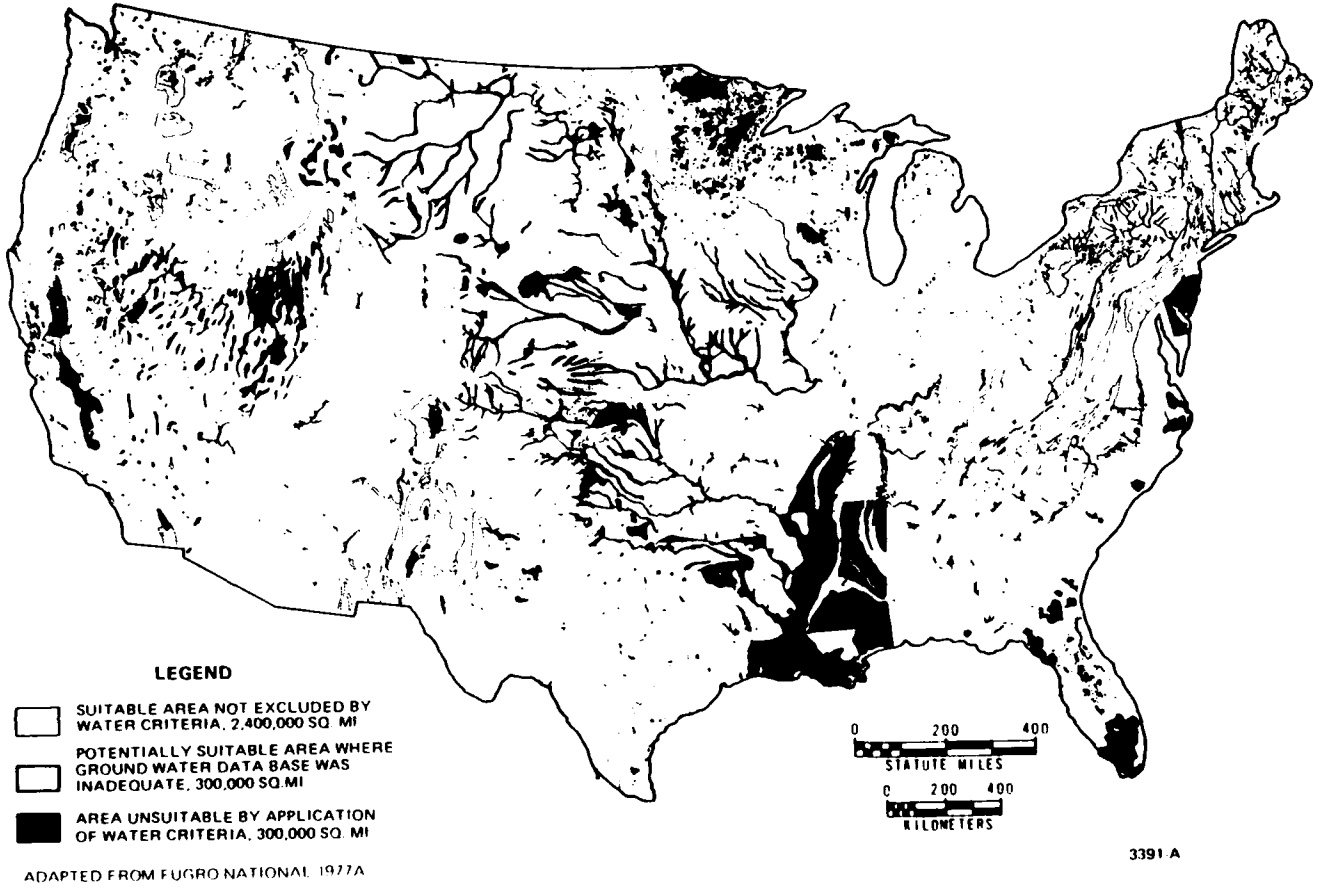

Figure 2.1.1.1-2. Areas excluded by depth to water -- coarse screening.

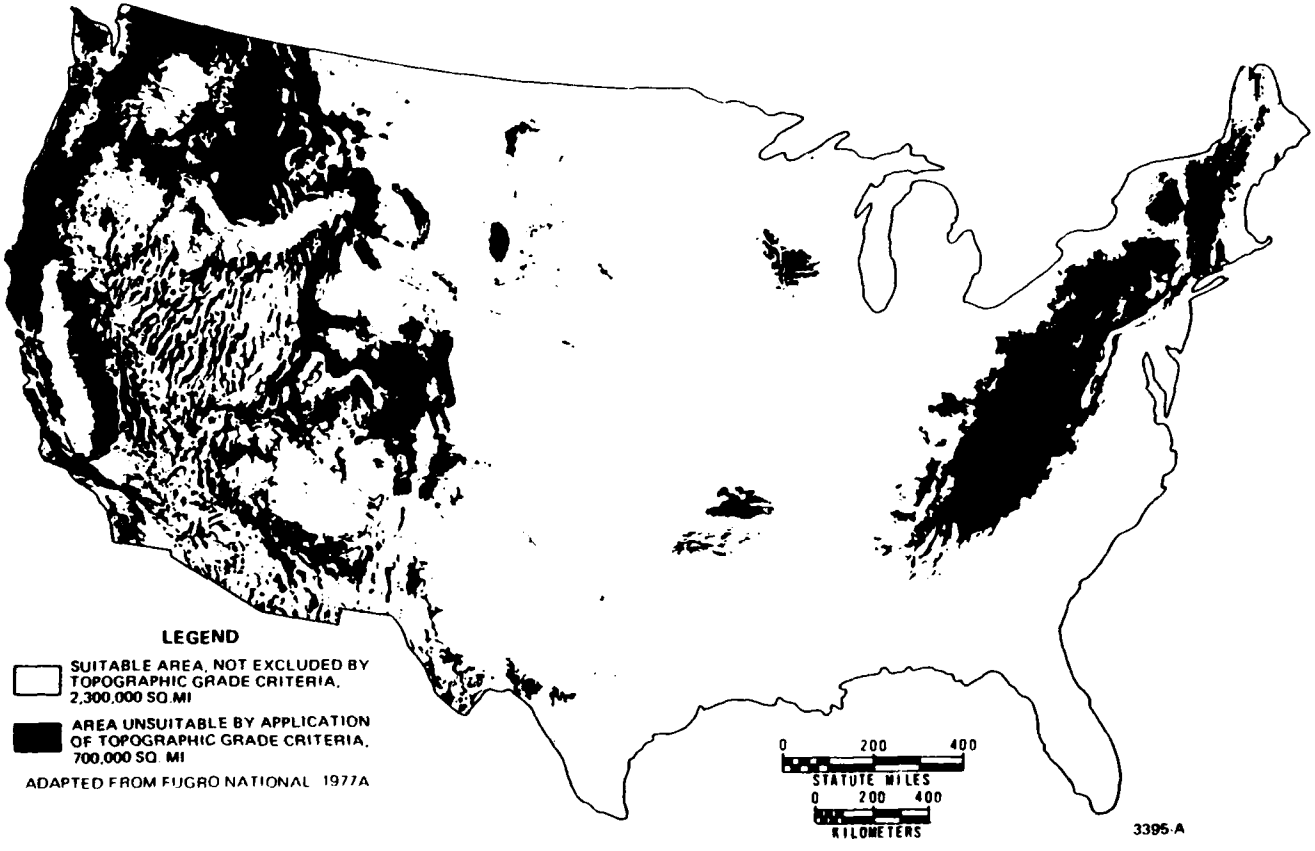

Figure 2.1.1.1-3. Area excluded by steep slopes -- coarse screening.

Figure 2.1.1.1-4 shows the results of applying these criteria. The irregularly shaped areas reflect the application of cultural exclusions, the larger circular areas are centered on cities of 25,000 population or more, and the smaller dots on towns of 5,000-25,000 population (1970 data). Population exclusions were the largest of all those applied during coarse screening, and a total of 1,400,000 sq mi, predominantly in the eastern and east central states, and in the far west, was excluded by this factor.

MINIMUM PARCEL. Areas with a parcel size of less than 660 sq mi (including aggregates of smaller parcels not separated by more than 11 sq mi) were excluded as not sufficiently large to be operationally suitable (Figure 2.1.1.1-5). (These criteria were originally established as 500 sq nautical miles and 10 nautical miles, respectively.) This criterion resulted in the exclusion of only 6600 sq mi, as shown in the figure.

Results (2.1.1.2)

The results of the coarse screening process are shown in Figure 2.1.1.2-1. The areas excluded by each of the criteria described in the previous subsection are summarized in Table 2.1.1.2-1. Because some of the exclusion criteria overlap, the total exclusion is less than the sum of the exclusion values shown in the table. In all, approximately 1,050,000 sq mi were found to be suitable or potentially suitable for M-X siting, including the following four categories:

- Suitable area: 320,000 sq mi
- Potentially suitable area with surface and/or subsurface rock conditions inadequately defined: 360,000 sq mi
- Potentially suitable area with ground water conditions inadequately defined: 3,000,000 sq mi
- Potentially suitable area with both surface and/or subsurface rock, and groundwater conditions inadequately defined: 90,000 sq mi

The definitiely suitable areas were generally west of the Mississippi River, as shown on the figure. The coarse screening process excluded approximately 65 percent of the conterminous United States from further consideration for M-X siting.

INTERMEDIATE SCREENING (2.1.2)

The approximately 1,100,000 sq mi area identified as suitable or potentially suitable for M-X siting as a result of the coarse screening was reduced to approximately 150,000 sq mi in intermediate screening. The screening process was conducted jointly by the Air Force's geotechnical contractor, with responsibility generally for the western states,

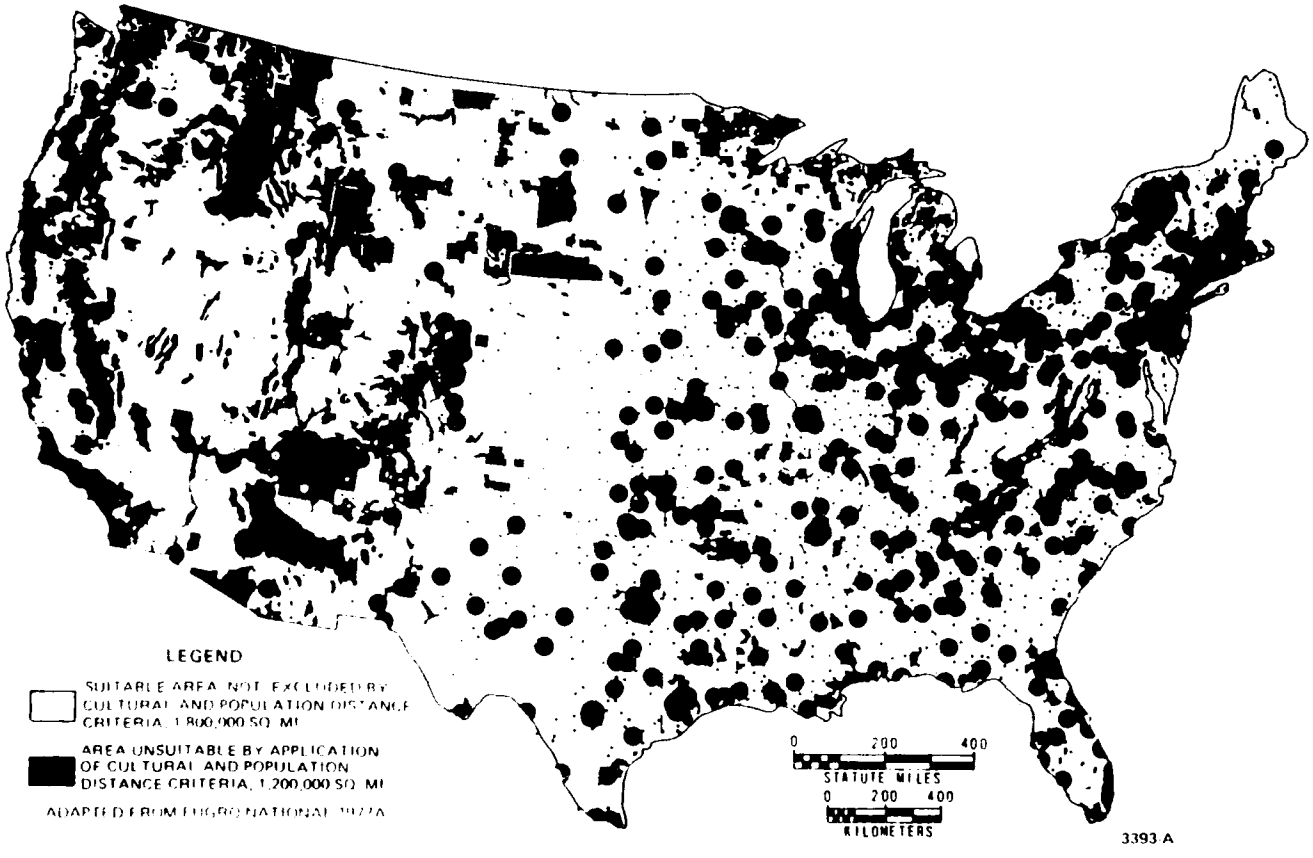

Figure 2.1.1.1-4. Area excluded by cultural features and proximity to population centers -- coarse screening.

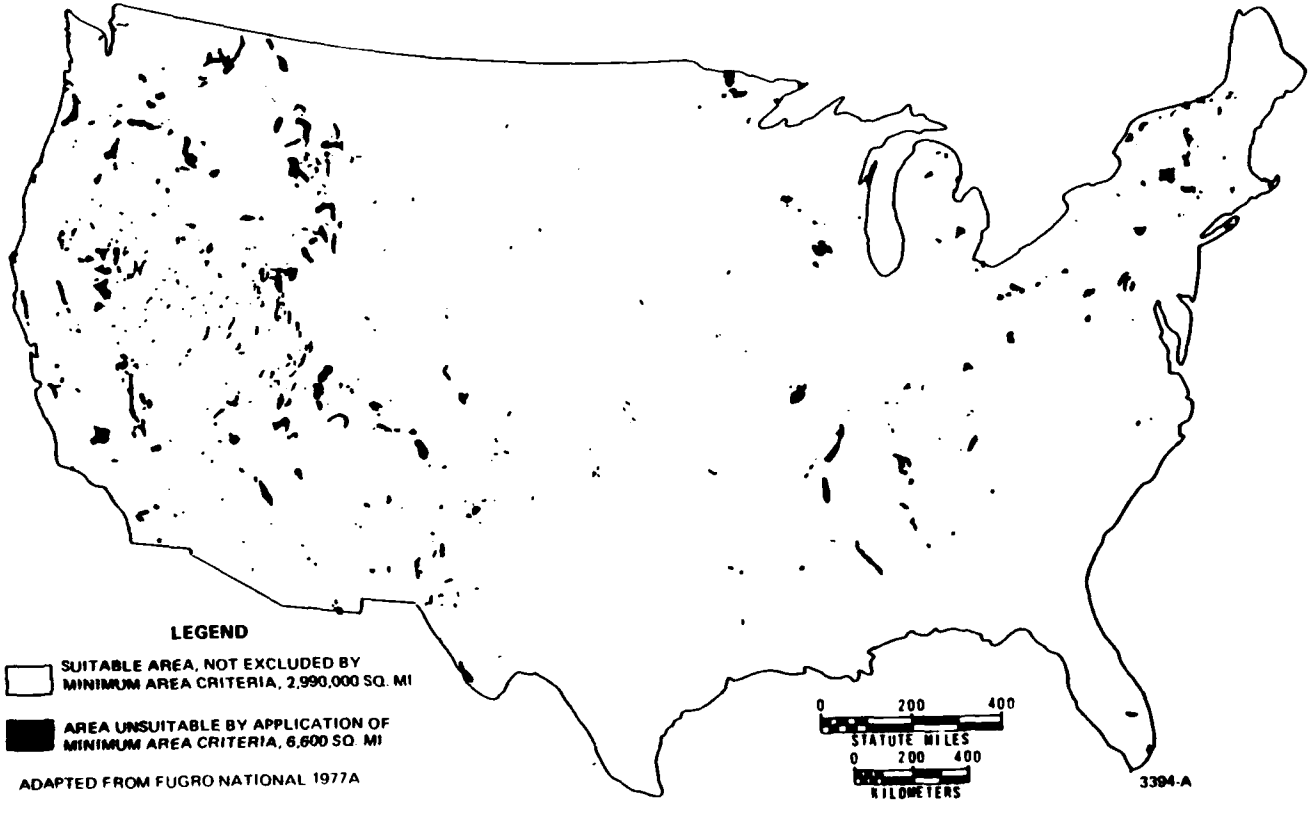

Figure 2.1.1.1-5. Area excluded by minimum parcel size criterion -- coarse screening.

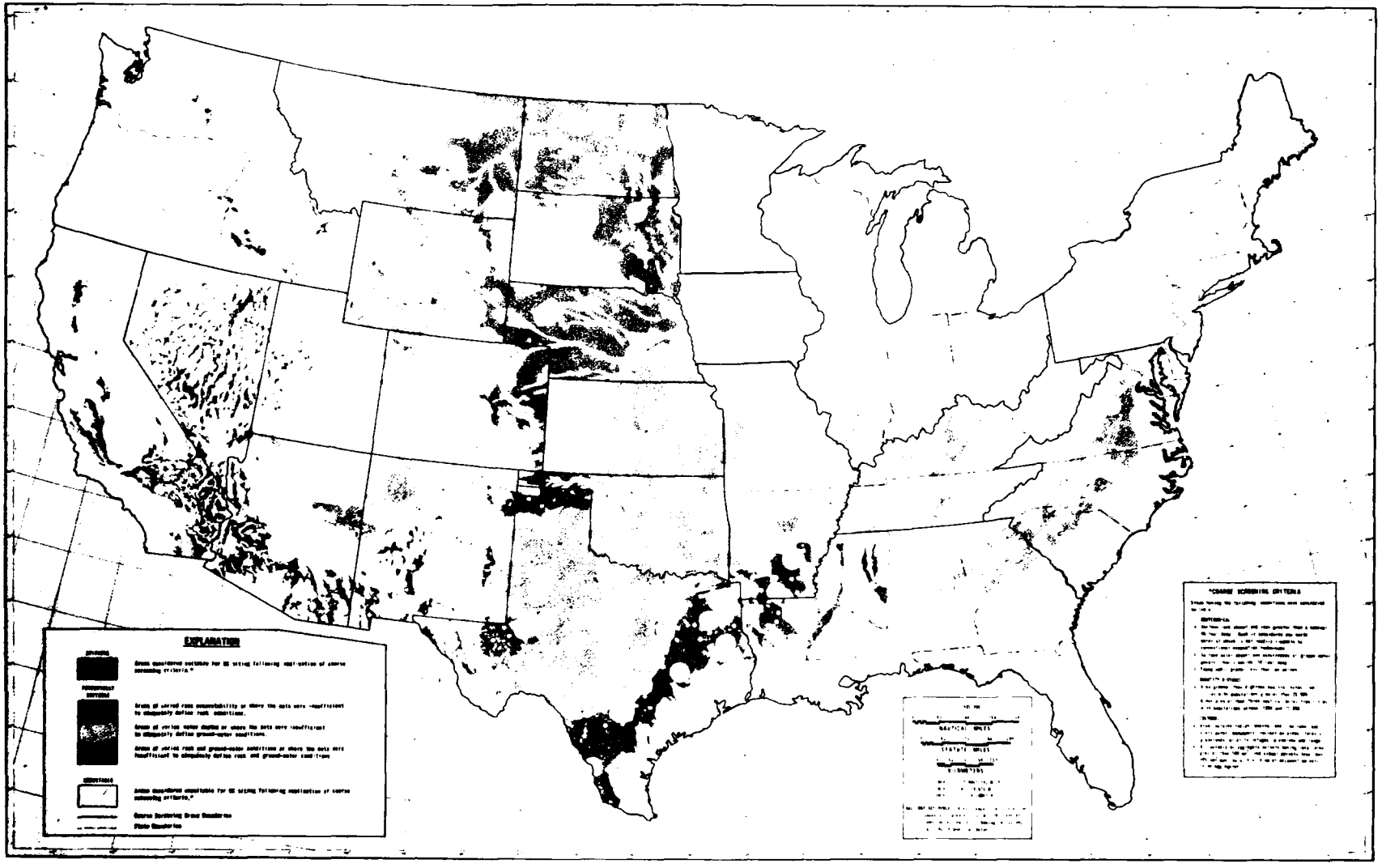

Figure 2.1.1.2-1. Results of coarse screening. Solid areas are suitable for siting horizontal shelters (or the buried trench under consideration at the time). White areas are unsuitable.

Table 2.1.1.2-1. Individual effects of coarse screening criteria on suitable area, conterminous United States.

EXCLUSION CRITERIA	AREA EXCLUDED BY CRITERIA (SQ MI)	AREA NOT EXCLUDED BY CRITERIA (SQ MI)
Surface rock, rock within 50 ft of the ground surface	700,000	2,300,000
Surface water, groundwater within 50 ft of the surface	300,000	2,700,000
Areas having grades exceeding 10 percent	700,000	2,300,000
Cultural exclusions	500,000	2,500,000
Population/distance exclusions	1,400,000	1,600,000
Minimum area exclusion	nil	3,000,000

4220

Source: FUGRO National, 1977a. Converted from nm^2 and rounded to nearest 100,000 sq mi.

and the Defense Mapping Agency (DMAAC) in St. Louis, Mo., with responsibility for the eastern states. The consolidated results of both efforts were documented by the geotechnical contractor (Fugro National, 1977B).

The criteria applied and the results of the intermediate screening process are summarized below.

Screening Criteria (2.1.2.1)

The criteria used for intermediate screening are given in Table 2.1.2.1-1. Criteria such as the standoff distances from population centers and depth to rock and water remained unchanged, although they were applied in increased detail. New cultural, topographic, and minimum parcel area of land criteria were applied however, as described below.

In contrast to coarse screening, in which the complete extent of applicability of a criterion was mapped each time, in intermediate screening an area once excluded by a specific criteria was not studied further, and the criteria most likely to generate large exclusions were studied first.

ROCK OCCURRENCE. The basic exclusion criterion (presence of surface rock, or rock within 50 ft of the surface) remained unchanged from coarse to intermediate screening. In the intermediate screening results, the non-excluded areas were separated into two classes of underlying materials--"suitable" and "suitable excavatable rock."

Suitable areas so defined are generally underlain by the geologically youngest deposits, composed of unconsolidated, moderately consolidated, and weakly lithified geologic formations and soil materials that can be readily excavated with conventional equipment to a nominal depth of 50 ft. These deposits generally consist of soil, alluvium, loess, and glacial till, which are found predominantly in valleys bounded by mountains, and in broad expanses of the interior plains.

Suitable-excavatable rock so defined, generally consists of lithified sedimentary formations which can be excavated over most or all of their thickness by conventional equipment to a nominal depth of 50 ft. For the most part, these rocks are poorly to moderately hard shales and sandstones.

WATER OCCURRENCE. Surface water and depth to water criteria remained unchanged from coarse to intermediate screening.

Table 2.1.2.1-1. Intermediate screening criteria.

CRITERIA	DEFINITION AND COMMENTS
Surface rock and rock occurring within a nominal 50 ft of the ground surface.	Rock is defined as any earth material which is not rippable by conventional excavation methods. Where available, seismic P-wave velocities were evaluated in the determination of rock conditions. In general, materials with velocities greater than 7,000 fps were considered as rock.
Surface water and groundwater occurring within a nominal 50 ft of the ground surface.	Surface water includes all significant lakes, reservoirs, swamps, and major perennial drainages. Water which would be encountered in a nominal 50 ft excavation was considered in the application of this criterion. Depths to groundwater resulting from deeper confined aquifers were not considered.
Topographic	
Percent Grade:	[1]Areas having surface gradients exceeding 10 percent as determined from maps at scale 1:250,000.
Relative Relief:	[1]Areas of characteristic terrain defined by a preponderance of slopes exceeding 5 percent as determined from maps at scales of 1:250,000, 1:62,500, and 1:24,000.
	[1]Areas having drainage densities averaging at least two 10 ft deep drainages per 1,000 ft (measured parallel to contours, as determined from maps at scales of 1:24,000.
Cultural	
Population/Distance:	Eighteen nmi, (20.7 mi) exclusion arcs from cities having populations (1970) of 25,000 or more.
	Three nmi (3.5 mi) exclusion arcs from cities having populations (1970) of between 5,000 and 25,000.
Land Use:	All significant federal and state forests, parks, monuments, and recreation areas.
	All significant federal and state wildlife refugees, grass lands, ranges, preserves, and management areas.
	Indian reservations.
Economic:	[1]High potential economic resource areas including oil and gas fields, strippable coal, oil shale and uranium deposits, and known geothermal resource areas (KGRAS).
	[1]Industrial complexes such as active mining areas, tank farms, and pipeline complexes.
Minimum Parcel:	[1]All parcels or aggregate parcels having total area less than 660 sq mi. Aggregate parcels must be a minimum of 200 sq mi to be included in the aggregate total and must not be isolated from adjacent suitable parcels by distances greater than 11.5 mi or by grades greater than 10 percent. Individual parcels may be further reduced in area if the combined or individual alignment of county, state, and federal paved highways, railroads, aqueducts, active pipelines, or perennial streams is sufficiently dense to restrict the emplacement of a straight 11.5 mi trench.

4219

[1]Criteria are new or modified from Coarse Screening study

Source: Adapted from FUGRO National 1977B

TOPOGRAPHIC. The percent grade exclusion (10 percent) remained unchanged between coarse and fine screening. However, the studies were conducted at larger (more detailed) map scales for improved accuracy of analysis.

Terrain roughness, which also influences mobility, and constructability, was an added criterion during intermediate screening. Areas were considered unsuitable if they had a preponderance of slopes exceeding 5 percent (approximately 2.9 degrees from the horizontal), or if two or more drainages 10 ft or more deep would be encountered in a 1,000-ft traverse along a path parallel to a contour (line of equal elevation).

CULTURAL. Economically important areas were added to the exclusion criteria during intermediate screening. These included two general classes:

- Energy-related, including oil and gas fields, strippable coal, oil shale and uranium deposits, and known geothermal resource areas.

- Industrial complexes, including active mining areas, tank farms, and pipeline complexes.

MINIMUM PARCEL. The minimum parcel area of land size remained unchanged from coarse to fine screening. However, a minimum area of 200 sq mi was imposed for the separate parcels that might be connected to consciute a total 660 sq mi parcel. Additionally, the effect of federal, state and, county paved roads, railroads, aqueducts, active pipelines, and perennial streams in rendering individual parcels unsuitable for siting was taken into account. (The siting criterion used was the ability to emplace a straight buried-trench protective structure 11.5 miles long, but is applicable to effective siting of discrete protective shelters as well.) A substantial amount of area, particularly in the eastern United States, was excluded by the minimum parcel size criterion in conjunction with the road/pipeline/stream density criterion.

Results (2.1.2.2)

Intermediate screening excluded all areas in the eastern United States, leaving potential siting areas in 15 western states. The approximately 1.1 million sq mi of suitable and potentially suitable area identified in coarse screening was reduced to approximately 150,000 sq mi in the areas shown in Figure 2.1.2.2-1. For purposes of analysis and locational reference in these early studies, the areas were grouped into the twelve Candidate Siting Provinces (CSPs) shown in the figure, each within an area of similar topographic, geologic, and hydrologic characteristics. The totals of the suitable area and potentially suitable area in each CSP are shown in Table 2.1.2.2-1.

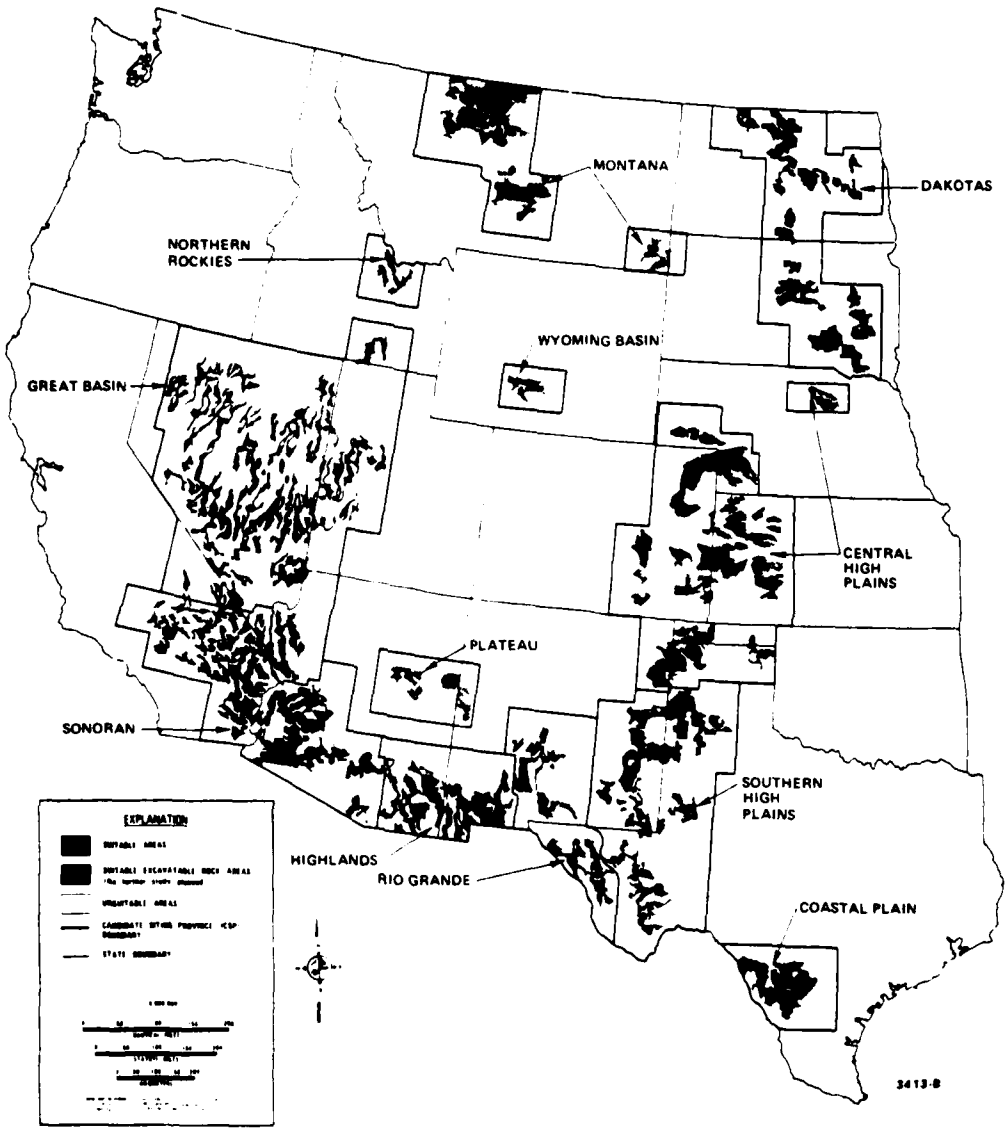

Figure 2.1.2.2-1. Results of intermediate screening.

Table 2.1.2.2-1. Suitable area by candidate siting province--intermediate screening.

CANDIDATE SITING PROVINCE (CSP)	AREA (SQ MI)[1]
Great Basin	34,000
Sonoran	23,100
Highlands	10,000
Plateau	2,500
Rio Grande	6,800
Coastal Plain	5,400
Southern High Plains	15,400
Central High Plains	24,700
Dakotas	11,800
Montana	12,800
Wyoming Basin	900
Northern Rockies	1,100
Total	148,500

4221

[1]Rounded to nearest 100 sq mi.

Table 2.1.2.2-2 shows the suitable area identified in intermediate screening by state, the CSPs involved, the class of underlying material, and ownership status. The largest amount of intermediate-screened suitable area is in the state of Nevada, and the least in Wyoming. The largest total amount (67,300 sq mi) of suitable land controlled by a single agency is federal land managed by the Bureau of Land Management (BLM) of the United States Department of Interior. The smallest amount (6,700 sq mi) is federal land under the management of the Department of Defense (DOD). The remaining area totaling 74,500 sq mi is under private or state ownership or under the management of federal agencies other than BLM or DOD.

An analysis of the intermeidate screening results showed that:

1) The Dakotas CSP, although containing an estimated 11,800 sq mi of suitable area, was judged relatively undersirable for M-X siting because of:

   a) The variability in thickness of the glacial drift, making depth to rock predictions difficult;

   b) Complex hydrologic conditions and multiple water depths due to variability in thickness and permeability of the glacial drift;

   c) High relative densities of utilities, road networks, and population.

2) The relatively small amount of suitable area and the isolated settings of the Colorado Plateau, Northern Rockies, and Wyoming Basin CSPs, the eastern portions of the Montana CSP, and the north-central Nebraska CSP make them relatively unsuitable for M-X siting.

3) Suitability for siting in excavatable rock areas is often difficult to determine due to unknown factors such as overburden thickness, thickness and extent of the indurated (hard) members, depth of weathered zones, and sparse hydrologic data. It was considered likely that higher construction costs would be incurred if the system were based in areas of excavatable rock, and that the Montana, Coastal Plain, Colorado Plateau, and Wyoming Basin CSPs were consequently relatively undesirable for M-X siting.

Based on these considerations, further studies were concentrated in the non-rock areas of the Central High Plains, Southern High Plains, Rio Grande, Highlands, Sonoran and Great Basin candidate siting provinces (Figure 2.1.2.2-2). Table 2.1.2.2-3 shows the amount of intermediate-screened area by CSP, and Table 2.1.2.2-4 shows the amount by state.

Table 2.1.2.2-2. Suitable area by state--intermediate screening (sq mi)

STATE	TOTAL SUITABLE AREA	INCLUSIVE CSP(S)	SUITABLE AREA		LAND OWNERSHIP CONDITIONS		
			NONROCK	ROCK	DOD AREA	BLM AREA	OTHER[1]
Arizona	20,800	Highlands	4,900		400	1,300	3,200
		Great Basin	2,600		0	2,100	500
		Plateau	700	1,100	0	0	1,800
		Sonoran	11,500		2,100	7,800	1,600
California	12,100	Sonoran	11,200		1,600	7,600	0
		Great Basin	900		0	900	0
Colorado	8,200	Central High Plains	6,500	1,700	0	0	8,200
Idaho	1,800	Northern Rockies	1,100		0	700	400
		Great Basin	700		0	400	300
Kansas	6,600	Central High Plains	5,900	700	0	0	6,600
Montana	12,800	Montana		12,800	0	1,900	10,900
Nebraska	4,200	Central High Plains	4,200		0	0	4,200
Nevada	25,800	Great Basin	25,300		1,700	23,000	600
		Sonoran	500		0	500	0
New Mexico	17,600	Highlands	5,100		0	4,800	300
		Central High Plains	1,600		0	0	1,600
		Southern High Plains	6,400	<100	0	5,700	700
		Rio Grande	3,800		900	2,900	0
		Plateau		700		700	0
North Dakota	6,100	Dakotas	5,900	200	0	0	6,100
Oklanoma	1,400	Central High Plains	1,400		0	0	1,400
South Dakota	5,700	Dakotas	5,700		0	0	5,700
		Montana		<100	0	0	<100
Texas	20,100	Central High Plains	2,800		0	0	2,800
		Southern High Plains	8,700	300	0	0	9,000
		Rio Grande	2,900		0	0	2,900
		Coastal Plain		5,400	0	0	5,400
Utah	4,400	Great Basin	4,400		0	4,200	200
Wyoming	900	Wyoming Basin		900	0	800	100
Total	148,500		124,700	23,800	6,700	67,300	74,500

4222

[1]Includes all private, state, and non-BLM, non-DOD-managed federal lands.

Source: FUGRO National, 1977b, rounded to nearest 100 sq mi.

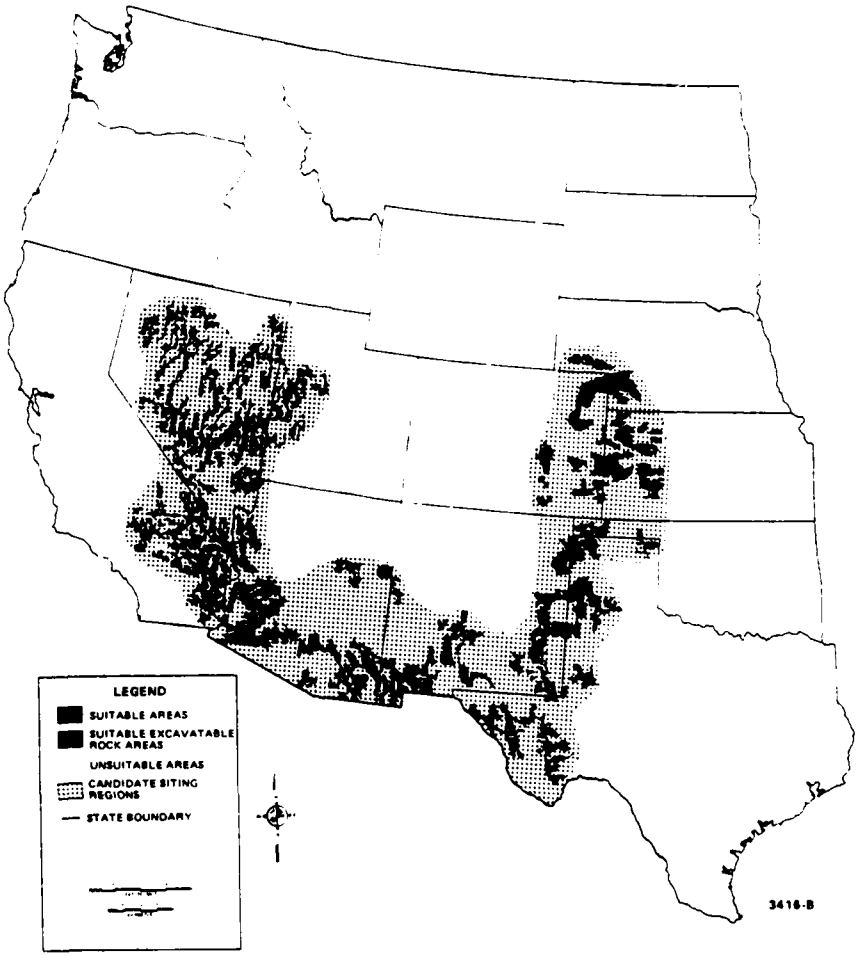

Figure 2.1.2.2-2. Candidate siting regions.

Table 2.1.2.2-3. Recommended suitable area by CSP--intermediate screening (sq mi).

CANDIDATE SITING PROVINCE (CSP)	TOTAL SUITABLE AREA	CSP STATES	AREA IN STATE
Central High Plains	21,700	Colorado	6,500
		Kansas	5,900
		Nebraska	3,500
		New Mexico	1,600
		Oklahoma	1,400
		Texas	2,800
Southern High Plains	15,100	New Mexico	6,400
		Texas	8,700
Rio Grande	6,700	New Mexico	3,800
		Texas	2,900
Highlands	10,000	Arizona	4,900
		New Mexico	5,100
Sonoran	23,200	Arizona	11,500
		California	11,200
		Nevada	500
Great Basin	33,900	Arizona	2,600
		California	900
		Idaho	700
		Nevada	25,300
		Utah	4,400
Total	110,600 (sq. mi)		110,600 (sq. mi)

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Table 2.1.2.2-4. Recommended suitable area by state--intermediate screening (sq mi).

STATE	TOTAL SUITABLE AREA	INCLUSIVE CSP(S)	RECOMMENDED SUITABLE AREA (NONROCK)	LAND OWNERSHIP CONDITIONS		
				DOD AREA	BLM AREA	OTHER[1]
Arizona	19,000	Highlands	4,900	400	1,300	3,200
		Great Basin	2,600	0	2,100	500
		Sonoran	11,500	2,100	7,800	1,600
California	12,100	Sonoran	11,200	1,600	9,600	0
		Great Basin	900	0	900	0
Colorado	6,500	Central High Plains	6,500	0	0	6,500
Idaho	700	Great Basin	700	0	400	300
Kansas	5,900	Central High Plains	5,900	0	0	5,900
Nebraska	3,500	Central High Plains	3,500	0	0	3,500
Nevada	25,800	Great Basin	25,300	1,700	23,000	600
		Sonoran	500	0	500	0
New Mexico	16,900	Highlands	5,100	0	4,800	300
		Central High Plains	1,600	0	0	1,600
		Southern High Plains	6,400	0	5,700	700
		Rio Grande	3,800	900	2,900	0
Oklahoma	1,400	Central High Plains	1,400	0	0	1,400
Texas	14,400	Central High Plains	2,800	0	0	2,800
		Southern High Plains	8,700	0	0	8,700
		Rio Grande	2,900	0	0	2,900
Utah	4,400	Great Basin	4,400	0	4,200	200
Total	110,600		110,600	6,700	63,200	40,700

4224

[1]Includes all private, state, and non-BLM, non-DOD-managed federal lands.

Source: FUGRO National, 1977b. Rounded to nearest 100 sq mi.

Intermediate screening also was based on literature and map studies, without field work. However, characterization studies were conducted subsequent to screening, within 24 comparatively small (less than 1,300 sq mi each) areas distributed over the recommended area defined by intermediate screening (see Fugro National, 1978). These earlier studies included geologic mapping, reconnaissance, and satellite-imagery interpretation; soils engineering studies based on borings and test pits; and seismic, resistivity, and gravity studies.

FINE SCREENING AND VALIDATION (2.1.3)

Fine screening studies of the suitable areas were conducted subsequent to the intermediate screening process. These studies considered three basing modes:

- Hybrid inline buried trench
- Vertical shelter
- "Loading dock" horizontal shelter. (This is essentially the type of horizontal shelter under present consideration.)

The studies associated with the buried trench basing mode identified further restrictions based on cultural features (e.g., minimum standoff distances from highways and railroads, the borders of national parks and forest, etc., that are no longer considered applicable). Vertical shelters, which involve excavations to a depth of approximately 125 ft, require a greater depth to rock and water than is necessary with horizontal shelters. Additional areas were consequently found to be unsuitable, as the result of a change in the depth-to-rock-and-water criterion from 50 ft to 150 ft. Horizontal shelters were considered compatible with the unmodified intermediate-screened area.

Existing military ranges were also excluded during the fine-screening process, since continuation of present range activities (e.g., firing of live ordnance) is not compatible with M-X basing. Alternative range areas would have to be found and acquired to accommodate these activities, and there would be substantial expense in moving or reproducing the associated physical equipmen . In addition, there are relatively small amounts of area suitable for M-X involved.

During this stage of screening, suitable areas were identified as Candidate Siting Regions (CSRs). The screening process identified seven CSRs as suitable for further evaluation. The area requirements for shelters were based on the 7,000 ft spacing and 4,000 shelters which was being used for planning at the time of these studies. The boundaries were defined through the following process:

- Aggregations of suitable areas were delineated that were larger than 1,325 sq mi (1,000 square nautical miles), and not crossed by interstate and United States highways, major streams, or major cultural features.

- The aggregations were combined, based on proximity to one another, to form the core of CSRs.

- Smaller aggregations of suitable land were added so that each CSR had, as nearly as practical, a minimum required area of 6,600 sq mi (5,000 square nautical miles).

Separate (but similar) maps were generated for each of the three basing modes. The map applicable to the horizontal shelter is shown in Figure 2.1.3-1. Names were not assigned to the CSRs during this stage of these early studies, and they were not confined within the boundaries of a single Candidate Siting Province.

Validation studies similar to the characterization studies have continued beyond the screening phase, to refine the limits of the suitable areas. Recent maps of suitable areas may consequently differ in some details from those presented here. These changes have not been sufficient to influence siting decisions, and are consequently not addressed in this technical report.

The number, pattern, and spacing of protective shelters has, however, changed since the CSRs shown in Figure 2.1.3-1 were selected. Alternate groupings of suitable areas into siting regions have consequently been necessary. These are described in Section 2.2 below.

2.2 M-X BASING AREA ANALYSIS REPORT

Initial screening activities applied geotechnical, cultural, environmental and topographical criteria to the 48 adjacent states. The previous section identified suitable land scattered in the shape of a horseshoe (ref. Figure 2.1.3-1) throughout the southwest. Each of the suitable areas was reevaluated for military and operational suitability with principal attention focused on survivability, verification and cost factors. Based on these factors, three screening criteria were developed to reduce actual or potential vulnerabilities of the M-X system during its life span, which could be 30 years or longer. These criteria included distance from the coast, distance from international borders and compatibility with the local area and activities. Application of the criteria determined there are two suitable reasons for deployment of M-X in a multiple protective shelter basing mode. These include portions of Nevada/Utah and Texas/New Mexico as shown in Figure 2.2-1. All information collected to date indicates that the Nevada/Utah region is the preferred region for M-X in a multiple protective shelter basing mode. Details of the narrowing process, explanation of the criteria and results are contained in the M-X Basing Area Analysis Report, Appendix A to this document. Additionally, the same discussion is included in Chapter 5 of the DEIS.

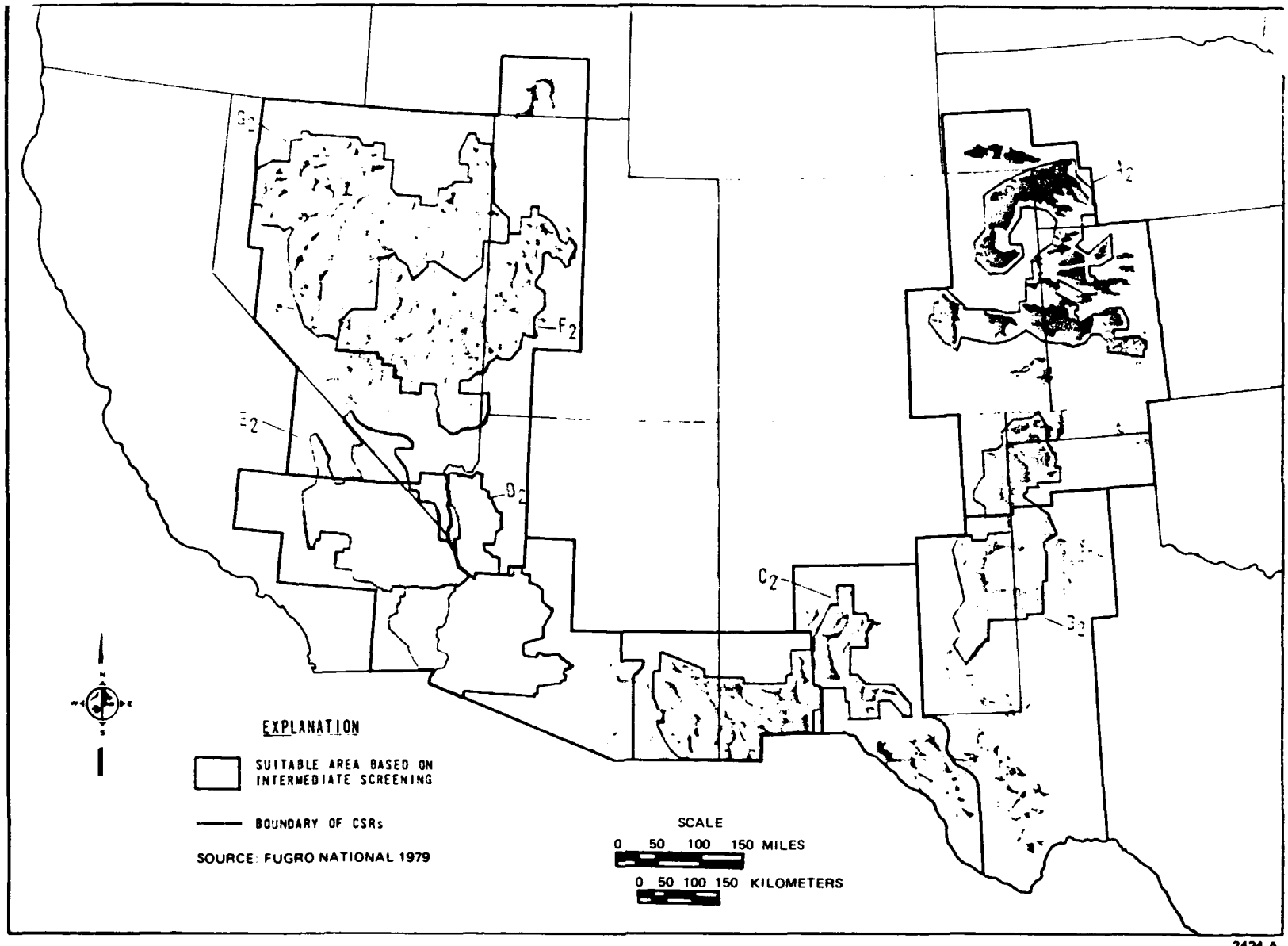

Figure 2.1.3-1. Candidate siting regions (CSRs) for horizontal shelters as established in fine screening.

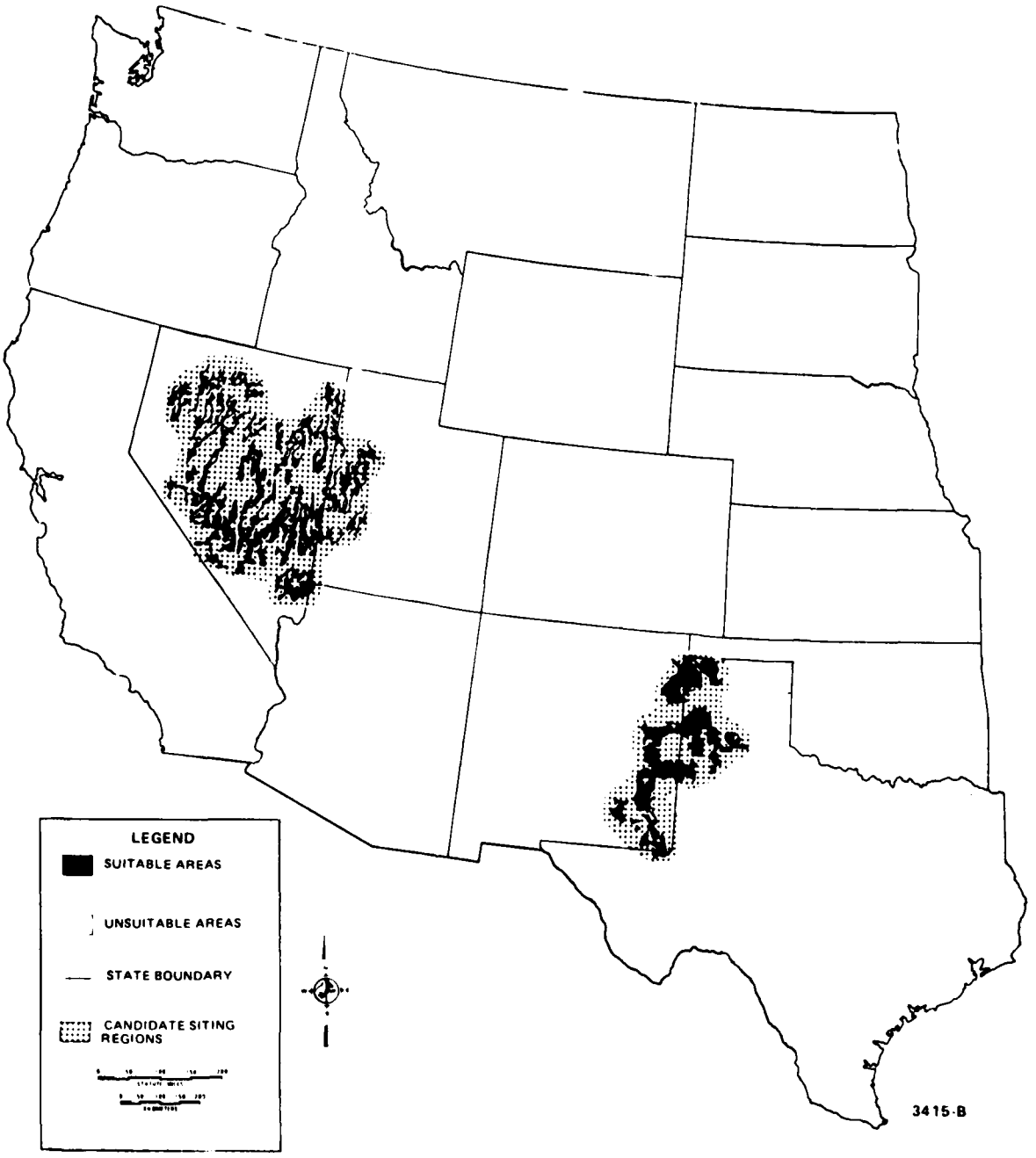

Figure 2.2-1. Suitable regions for M-X deployment.

3.0 SUITABLE DEPLOYMENT AREA

Section 2.0 described the process that led to elimination of all potential siting regions other than areas within the states of Nevada/Utah and Texas/New Mexico. The criteria included operational and survivability factors, minimum interference with established cultural features, and minimum disruption of economic resource areas.

This section describes the factors that have led to the selection of suitability zones for the designated deployment area (DDA)--that is, the area within which the M-X and related security and maintenance facilities will be deployed. The facilities to be sited are described briefly first for orientation of the reader: more extensive descriptions are given in Chapter 2 of the EIS. Emphasis is placed on those facilities that influenced the screening criteria described previously, or whose functions influence siting. The additional criteria that influenced site selection are then described and illustrated as appropriate. The resulting suitability zones for DDAs in the separate siting regions and for split basing are then illustrated.

3.1 DESIGNATED DEPLOYMENT AREA FACILITIES

The DDA is where the major M-X system facilities will be constructed and the system elements operated. These facilities include 4,600 horizontal shelters (grouped in clusters of 23), 200 missile/launcher transport vehicles, 200 cluster maintenance facilities (one per cluster), cluster roads, the major portion of a special interconnecting road (the designated transportation network or DTN), area support centers (3-6), and earth barriers (200, each restricting a missile to its assigned cluster to aid in Strategic Arms Limitation Treaty (SALT) verification). Additionally, the DDA will contain major portions of an electrical power distribution system, physical security system, buried antennas, and a buried fiber optic command, control, and communications network. The major system elements include 200 missile/launchers and 200 transporters.

A more detailed description of the DDA facilities with illustrations is included in the appendices of this document.

3.2 CRITERIA TO DETERMINE SUITABLE DEPLOYMENT AREAS

The screening process and the application of military and operational criteria narrowed the continental United States down to portions of the Nevada/Utah and Texas/New Mexico regions which are considered to be suitable for M-X deployment. The next step in the selection of locational alternatives was to develop more refined criteria which would identify suitable lands on which to deploy M-X facilities and roads.

The purpose of each of the criteria developed for the M-X system was to satisfy operational requirements; to co-exist with local activities; to create minimum adverse impact to the environment; and to deploy, operate, and maintain the system in an efficient, economical manner.

The M-X system is an integral combination of the DDA (clusters, shelters, maintenance facilities, area support center, roads, etc.) and the operating bases (OB). However, there are separate criteria for each due to their separate functions. This section addresses the DDA, and Section 4 will focus on the OB.

The criteria to determine suitable lands on which to deploy shelters, facilities, and roads are shown in Table 3.2-1 and are briefly addressed below:

Geotechnical

Bedrock

Any areas with surface rock or rock within 50 ft of the surface were rejected because the presence of rock would make construction more difficult and raise costs. Furthermore, the survivability of the proposed shelters might be degraded by possible blast waves (from near hits in an attack environment) reflected off bedrock less than 50 ft beneath the ground level.

Water Table

Based on experience with the current Minuteman and Titan ICBM systems it is desirable to site shelters to avoid flooding and/or the need for pumps in the shelters. Any areas with water within 50 ft of the surface were rejected.

Deployment in Multiple States

The Senate Armed Services Committee Report language for the FY81 Authorization Bill addressed split basing.

> ". . .Deployment of an MPS system of this scope may have significant environmental, social and economic impacts if the system is concentrated in one deployment area. All reasonable deployment areas should be carefully examined in a study to be submitted to Congress by February 1, 1981. The study should include assessments of environmental, social and economic impacts and ways of mitigating adverse impacts. The study should also include evaluation of total costs to the Government of split basing and the effects on military performance . . ."

Table 3.2-1. Exclusion/avoidance criteria for shelters, cluster maintenance facilities, and roads.

Geotechnical	Depth to rock less than 50 ft. Depth to water table less than 50 ft. Surface water, including lakes, reservoirs, swamps, perennial drainages, and playas subject to flooding.
Topographical	Shelter: Nominal slope greater than 5 percent. Rolling terrain and areas where more than two 10-ft deep drainages occur per 1,000 ft. DTN: 7 percent or greater slope. Cluster road: Nominal slope greater than 5 percent (occasional 1,000 ft. sections may be considered having up to 10 percent).
Demographic	Exclusion radii from population centers: 2 mi from cities of 25,000 or more. 3.5 mi from cities of 5,000 - 25,000. 1 mi from cities of 5,000 or less. Cluster roads should avoid existing federal, state, and county roads with average daily traffic of greater than 250 vehicles per day.
Explosive Safety Distances	Observe safety standoff distances in accordance with AFR 127-100. Public traffic route - 1,780 ft Inhabited buildings - 2,965 ft Pipelines (buried) - 300 ft Above ground POL - 1,800 ft Above ground electrical distribution lines > 15,000 V - 1,780 ft Radio/microwave facilities - 2,965 ft Area support centers - 2,965 ft
Electrical Standoff Distance	Shelters will not be located less than prescribed distances from existing overhead power lines and power generation facilities. Power Rating — Minimum Distance 50 KV or less — 750 ft 50 - 250 KV — 1,250 ft 250 KV or more — 2,500 ft
Land Area	Sufficient suitable land must be available to space shelters in cluster pattern. Minimum spacing between adjacent shelters is 5,000 ft. Avoid state and private property.
Cultural and Environmental Exclusions	Designated wilderness and wilderness study areas. Existing state and national parks and proposed Great Basin National Park. Existing Indian reservations. Registered historic and archaeologic properties. Designated critical habitat of federal T/E species. Existing state and national monuments. Existing and proposed national wildlife refuges. Existing and proposed national ranges and preserves. Existing state and national forests and national grassland. Military ranges, training areas, proving grounds, test sites.
Cultural and Environmental Exceptions (case-by-case)	Populated areas (see "demographics" above). Irrigated farmland. High actual and potential economic resource and activity areas. Moapa expansion - public lands requested for withdrawal for expansion of the Moapa reservation. Duckwater expansion - public land which has been identified to the Air Force for possible reservation expansion. Habitats of significant species.

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Section 202 of the FY81 Military Authorization Bill stated

". . .(c) Notwithstanding any other provision of law, the initial phase of construction shall be limited to 2,300 protective shelters for the M-X missile in the initial deployment area.

(d) In accordance with the finding of Congress expressed in subsection (a), a full system of at least 4,600 protective shelters may be deployed in the initial deployment area if after completion of a study to be conducted by the Secretary of Defense of an alternative site for a portion of the system, it is determined by Congress that adverse cost military considerations, or other reasons preclude split basing."

Topographical

Rolling terrain and steep slopes are exclusionary criteria. It is desirable from construction, cost, and operational viewpoints to build shelters and roads on relatively flat lands. Large vehicles required for M-X require more power to negotiate steep inclines. Engineering limits have been established to keep DTN slopes at 7 percent or lower and shelter/cluster road slopes at 5 percent. The shelters need to be on flatter ground than for the designated transportation network. Additionally, the cost of shelter construction as well as the amount of disturbed land, vehicle fuel consumption, and air pollution would increase if shelters are constructed on slopes exceeding 5 percent.

Design objectives are to avoid, if possible, interstate highways or county roads. One exception might be in mountain pass regions where the DTN may have to share existing rights of way. Avoidance of busy thoroughfares assists the SAL monitoring process and possibly averts traffic delays when missiles must be moved over the DTN.

Roads may cross through a non-suitable area as long as slope criteria and environmental exclusions are not violated.

Demographic

Distances from population centers are the same as used for earlier screening. The exclusion zones near populated areas are for public safety and security, and to allow room for future community development.

Explosive Safety Distances

Required by AFR regulation 127-100 to protect the public from hazards of storing missiles in shelters and other M-X facilities applies primarily to siting shelters, cluster maintenance facilities, missile assembly buildings, and missile stage storage areas.

Electrical Standoff Distance

Electrical power generation and distribution facilities are avoided because electrical and electronic equipment is susceptible to electromagnetic interference (EMI). Therefore the minimum separation distances included in the criteria are intended to prevent EMI due to electrical power generation and distribution facilities from adversely impacting the M-X system. These minimum distances may be reduced by providing adequate protection from EMI effects but costs of doing so would be high.

Land Areas

Areas which are defined as being suitable must be as contiguous as possible and of sufficient parcel size to accommodate full clusters of 23 shelters each.

EXCLUSIONS

Certain areas are not available for potential M-X deployment due to legal requirements or to policy commitments and have been excluded from consideration for siting M-X facilities.

Legal Exclusions

Legal exclusions are areas which are not available for potential M-X deployment due to legal requirements. Only two land categories have been identified as legally excluded: Designated Wilderness Areas and Potential Wilderness Areas (including the results of various agency reviews such as RARE II and Wilderness Study Areas). Figure 3.2-1 shows areas under review for wilderness designation.

- Designated Wilderness Areas

  By terms of the Wilderness Act (16 USC 1131 et seq.) designated wilderness areas are not available for development including roads, structures, mechanical transport, or comparable development. These areas were removed from further consideration as potential M-X deployment areas during the initial screening process.

- Potential Wilderness Areas

  Section 603(a) of the Federal Land Policy and Management Act (43 USC 1701 et seq.) requires all federal agencies to inventory public lands for wilderness suitability. Suitable lands (defined by 16 USC 1131 c) must be managed in a manner to preserve their wilderness suitability until final classifications are determined (by 1991). Federal land management agencies (particularly BLM and United States Forest Service)

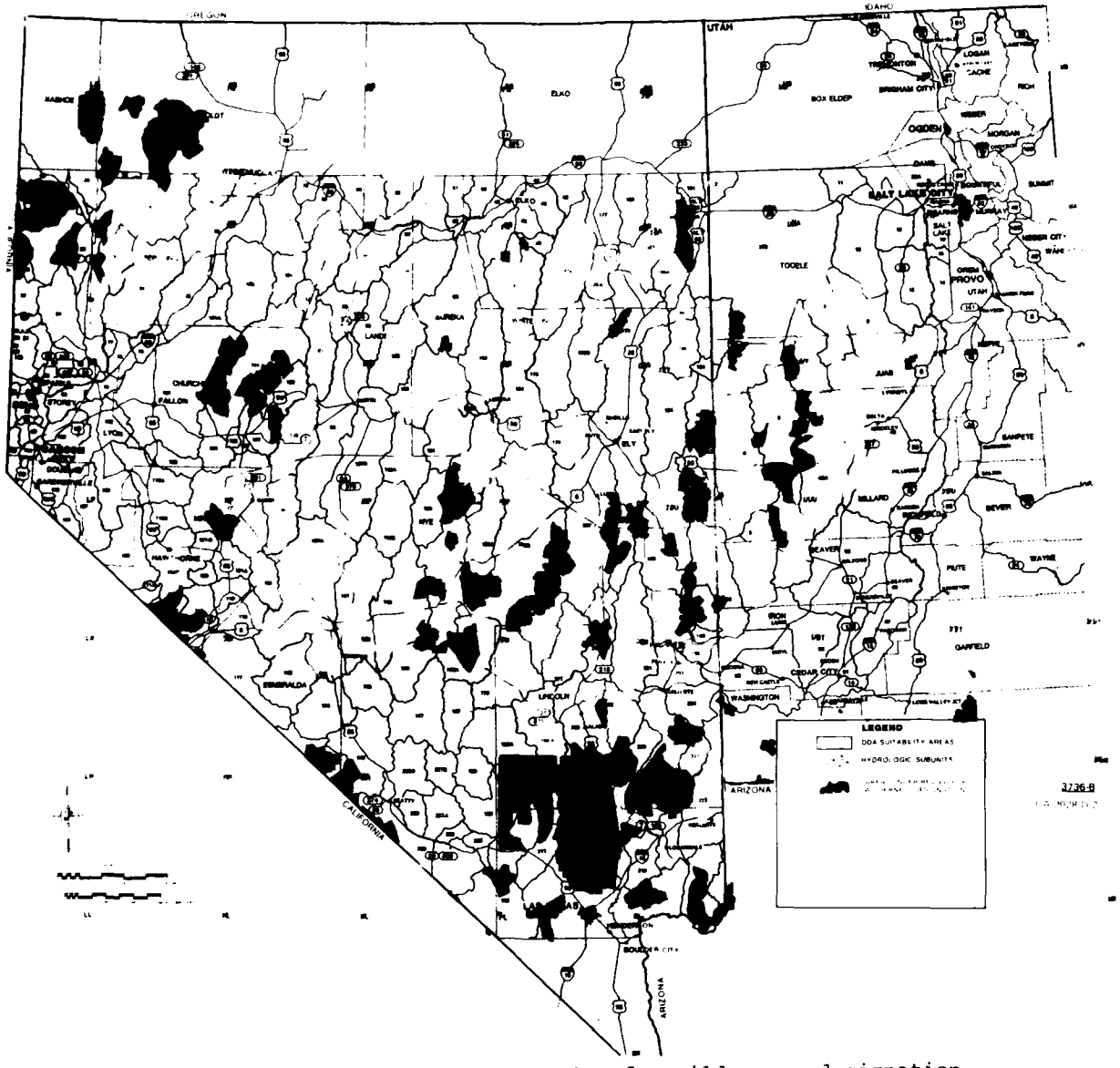


Figure 3.2-1. Areas under review for wilderness designation.

have identified areas that they feel meet wilderness criteria. These processes are not complete but, for the moment, the identified areas are the best available indication of potential wilderness areas. Areas may be added or deleted during several remaining steps. These areas were not excluded during initial screening due to the unavailability of data.

Policy Exclusions

Policy exclusions result from commitments made in Air Force regulations, during establishment of initial screening criteria, during scoping for the Deployment Area Selection and Land Withdrawal/Acquisition EIS and in statements made by responsible Air Force officials. Almost all policy exclusions were also included in the set of initial screening criteria. Native American grazing allotments, officially recommended/proposed forests, parks, landmarks, Indian reservations, paleontological, archaeological, or historical sites and designated recreation areas were added during scoping. Power generating plants and transmission lines is one of the initial screening criteria, although it has not been shown on screening maps to date due to the resolution of the data.

- Indian Reservations (see Figure 3.2-2)

  The Air Force has declared as policy the exclusion of all Indian reservations and colony lands from consideration for deployment. There are over 482,000 acres of such lands in the Nevada/Utah study area which fall under Federal Trust status.

- Federal and State Forests, Parks, and Monuments; Federal and State Wildlife Refuges, National Grasslands, Ranges and Preserves (see Figures 3.2-3 through 3.2-5)

  These areas are legally available as potential M-X sites since they have not been deprived of other uses by perpetual Congressional dedication (Reichelderger V. Quinn (1932) 287 US 315 77 L.Ed. 331, 53 S.Ct. 177; FLPMA, Title V, Sec. 501 et seq.; 16 USC 668 dd(d)(1) and others), however, the Air Force has determined that these areas will not be considered as potential deployment areas.

- Indian Grazing Lands

  In addition to the over 482,000 acres of reservation land in the Nevada/Utah study area, tribal governments hold an estimated 66,397 acres in BLM grazing permits. These are the Duckwater, Yomba, and Te Moak Shoshone grazing allotments. The Air Force has excluded such lands from consideration for deployment.

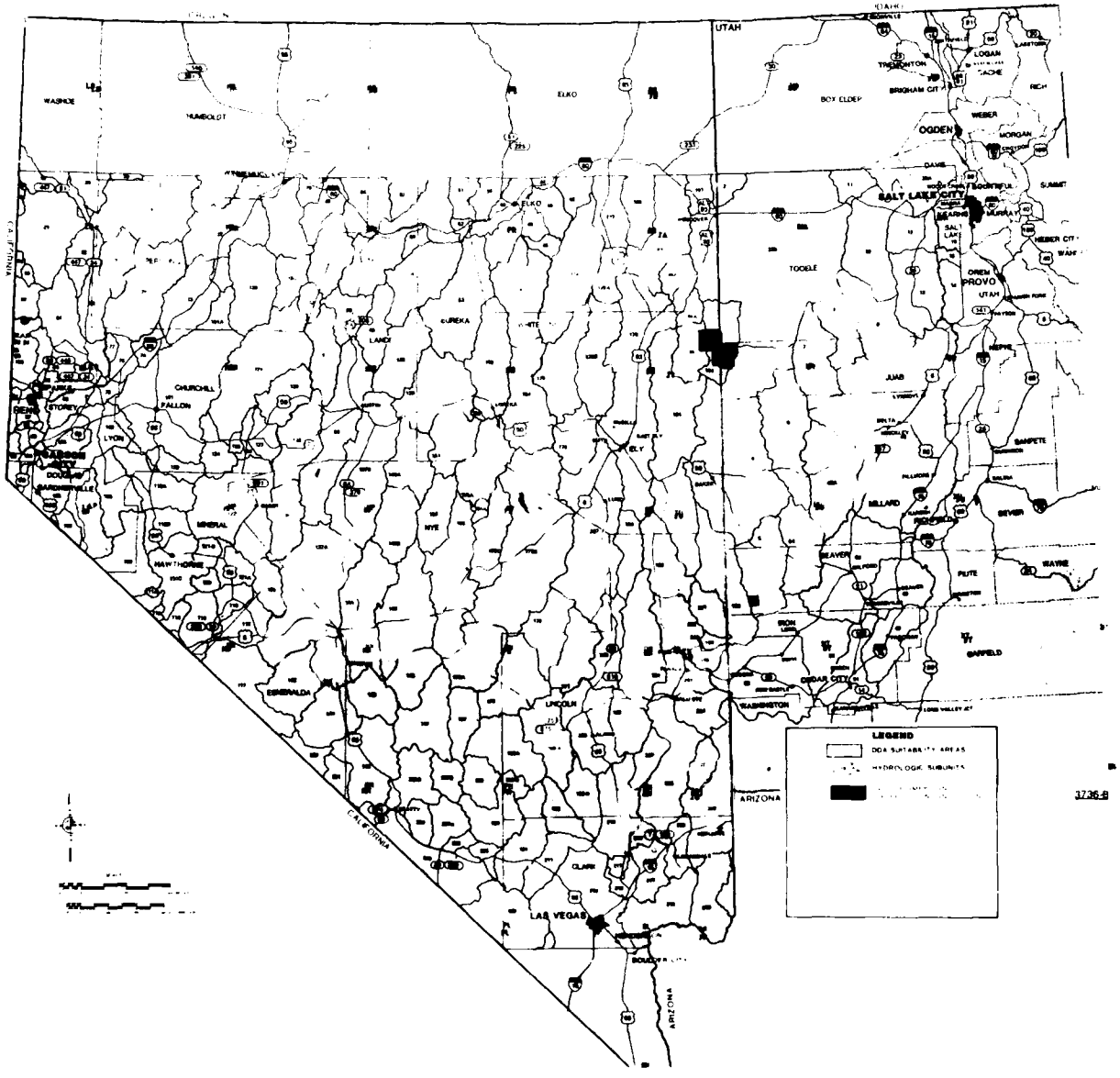


Figure 3.2-2. Native American reservations and colonies in the Nevada/Utah study area.

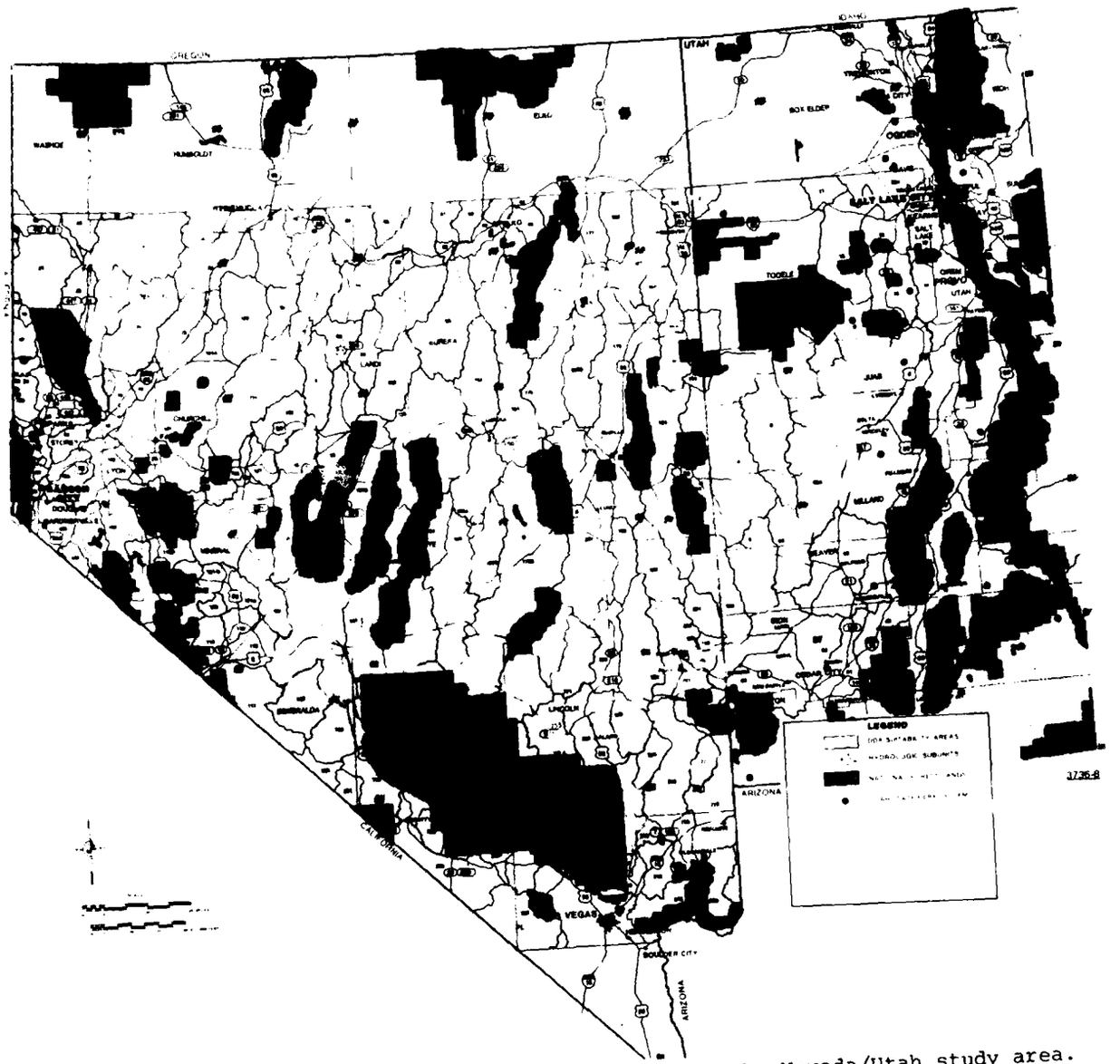


Figure 3.2-3. National forest lands and parks in the Nevada/Utah study area.

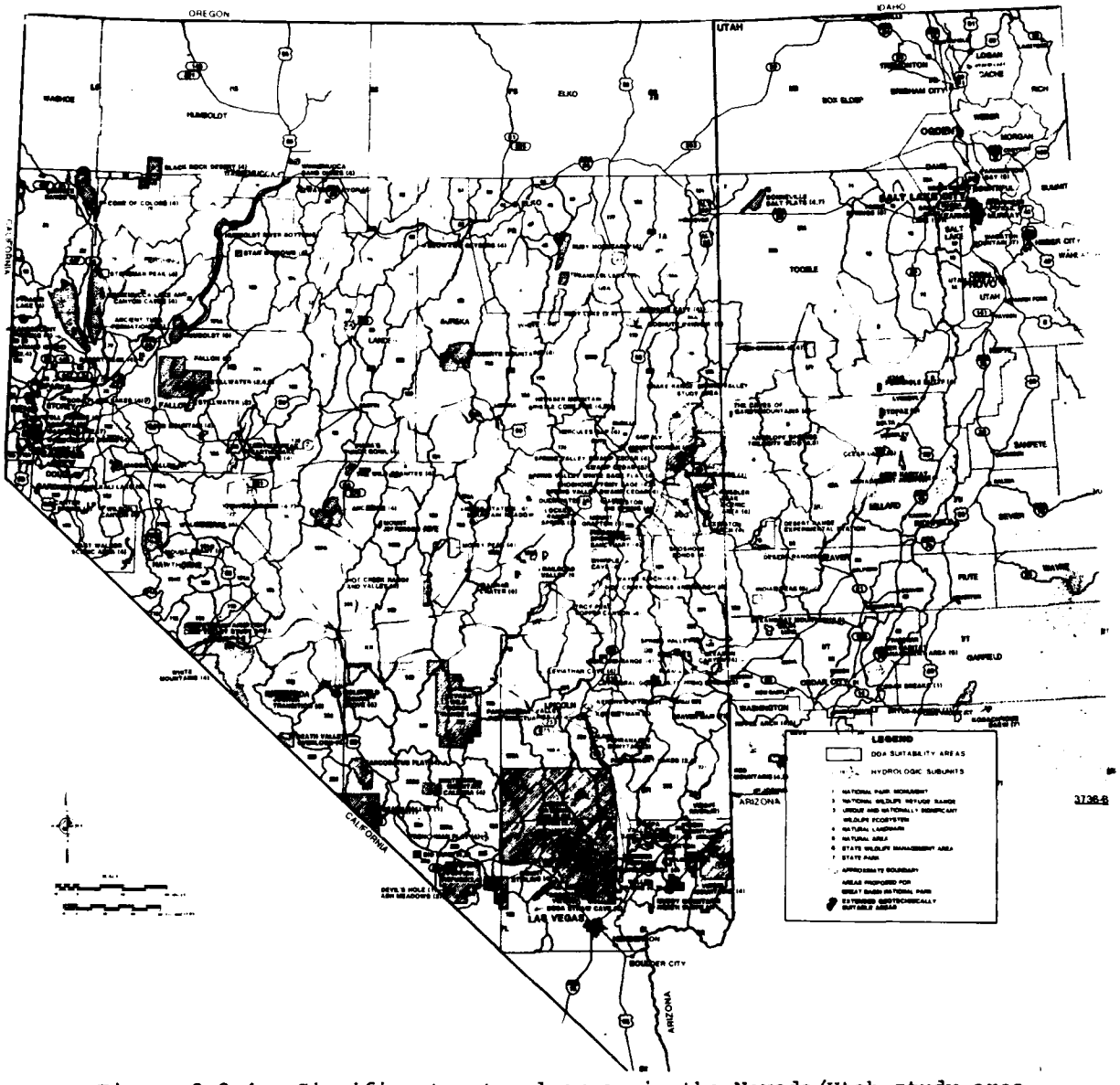


Figure 3.2-4. Significant natural areas in the Nevada/Utah study area.

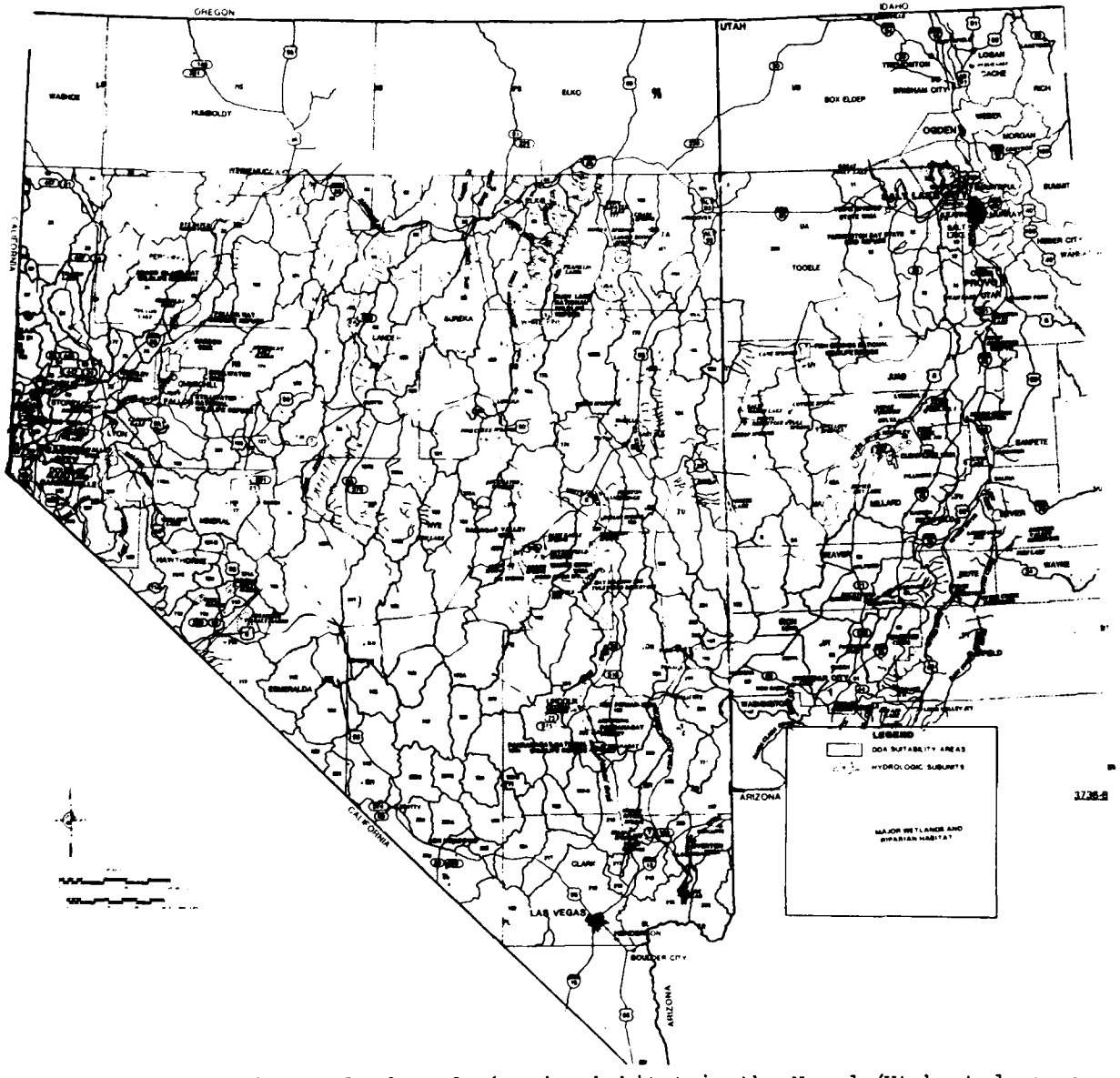


Figure 3.2-5. Major wetlands and riparian habitat in the Nevada/Utah study area.

- Surface Waters

  Executive Order 11988 directs implementation of the "United National Program for Flood Plain Management" (United States Water Resources Council, 1976) which recommends federal and state action to reduce the risk of flood losses through floodplain management. The floodplain is taken here to include lakes and reservoirs as well as swamps, perennial drainages, and playas which are subject to flooding, as shown on 1:62,500-scale maps. This criterion is also related to operational requirements and was applied during initial screening as well as during higher resolution analysis.

- High Potential Economic Resource Areas/Industrial Areas (see Figures 3.2-8 through 3.2-10).

  These areas were avoided by policy as part of the initial screening, i.e., oil shale deposits, uranium deposits, known geothermal resource areas, active mining areas, tank farms, and pipeline complexes. Not only are these resource areas of national significance, they are also key elements in the economic structure of the four states.

- Populated Areas

  Exclusion areas have been defined based on the population of cities and communities. Criteria used during initial screening are 20 statute mile exclusion areas from cities with populations of 25,000 or more; three and one-half statute mile exclusion from cities having populations of between 5,000 and 25,000; and one statute mile from communities with population less than 5,000. In addition, isolated homes, farmhouses, and ranch houses are to be avoided to the maximum degree possible during higher resolution siting decisions.

- Officially Recommended/Proposed Forests, Parks, Landmarks, Indian Reservations, Paleontological, Archaeological, or Historical Sites

  These areas are afforded even less legal protection from development than comparable designated sites. Included in this category are the proposed Great Basin National Park and a small number of sites in each state that have been found eligible for inclusion in the National Register by the State Historic Preservation Office and are awaiting a final determination by the Keeper of the National Register. Such properties have been avoided in current layouts as an initial means of reducing project impacts.

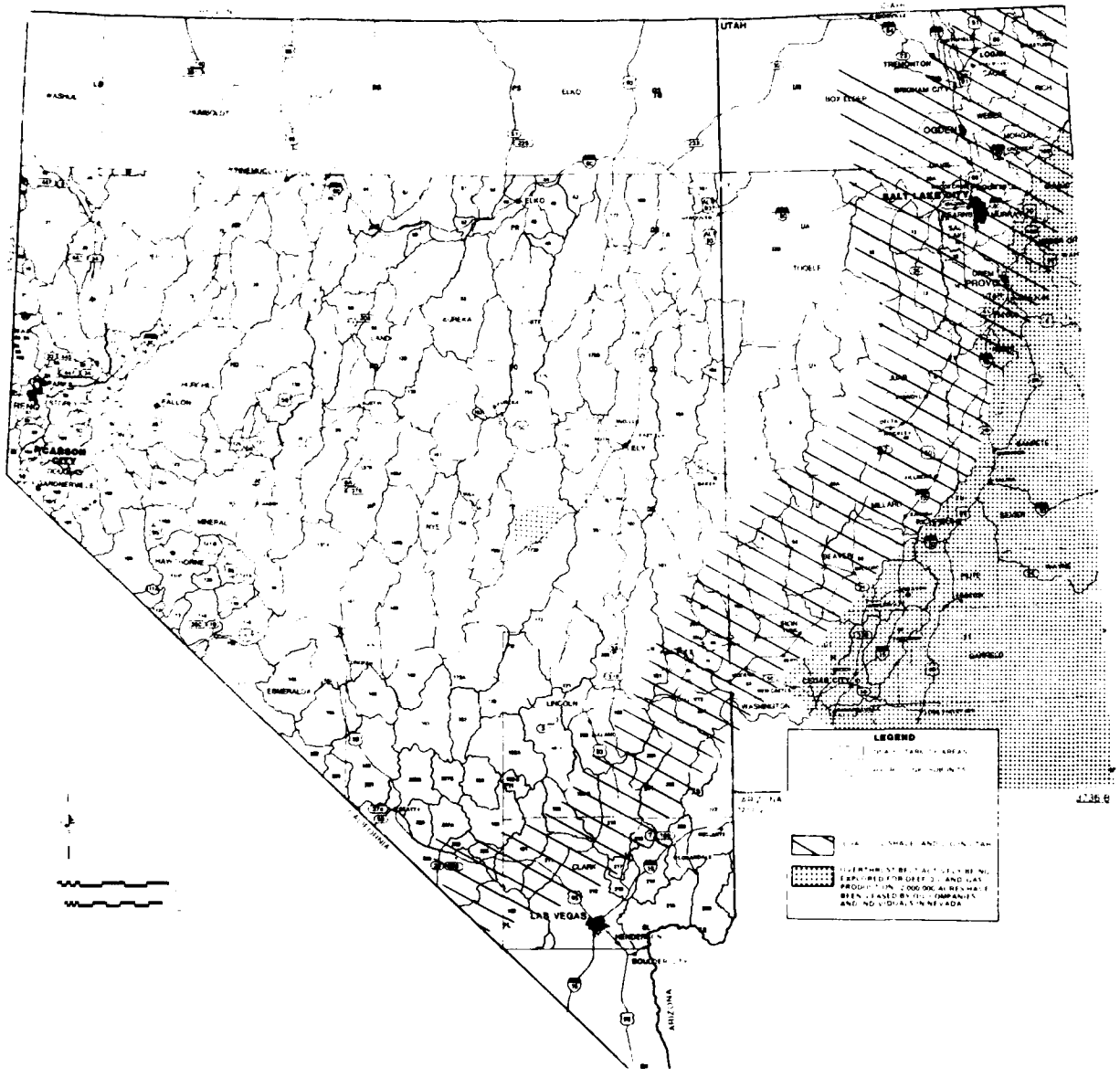


Figure 3.2-6. Coal, oil shale, and oil/gas in the Nevada/Utah study area.

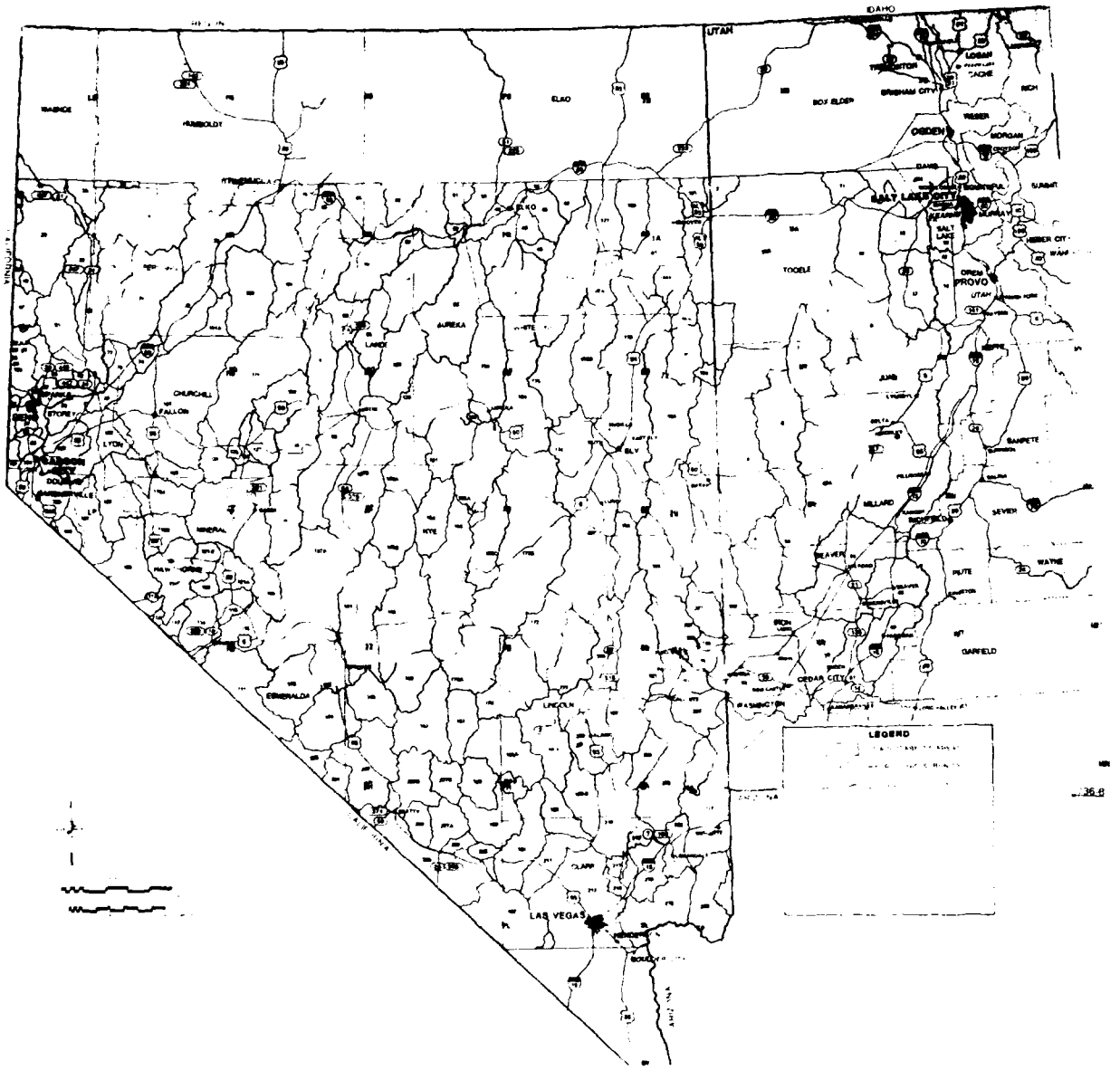


Figure 3.2-7. Existing pipelines in the Nevada/Utah study area.

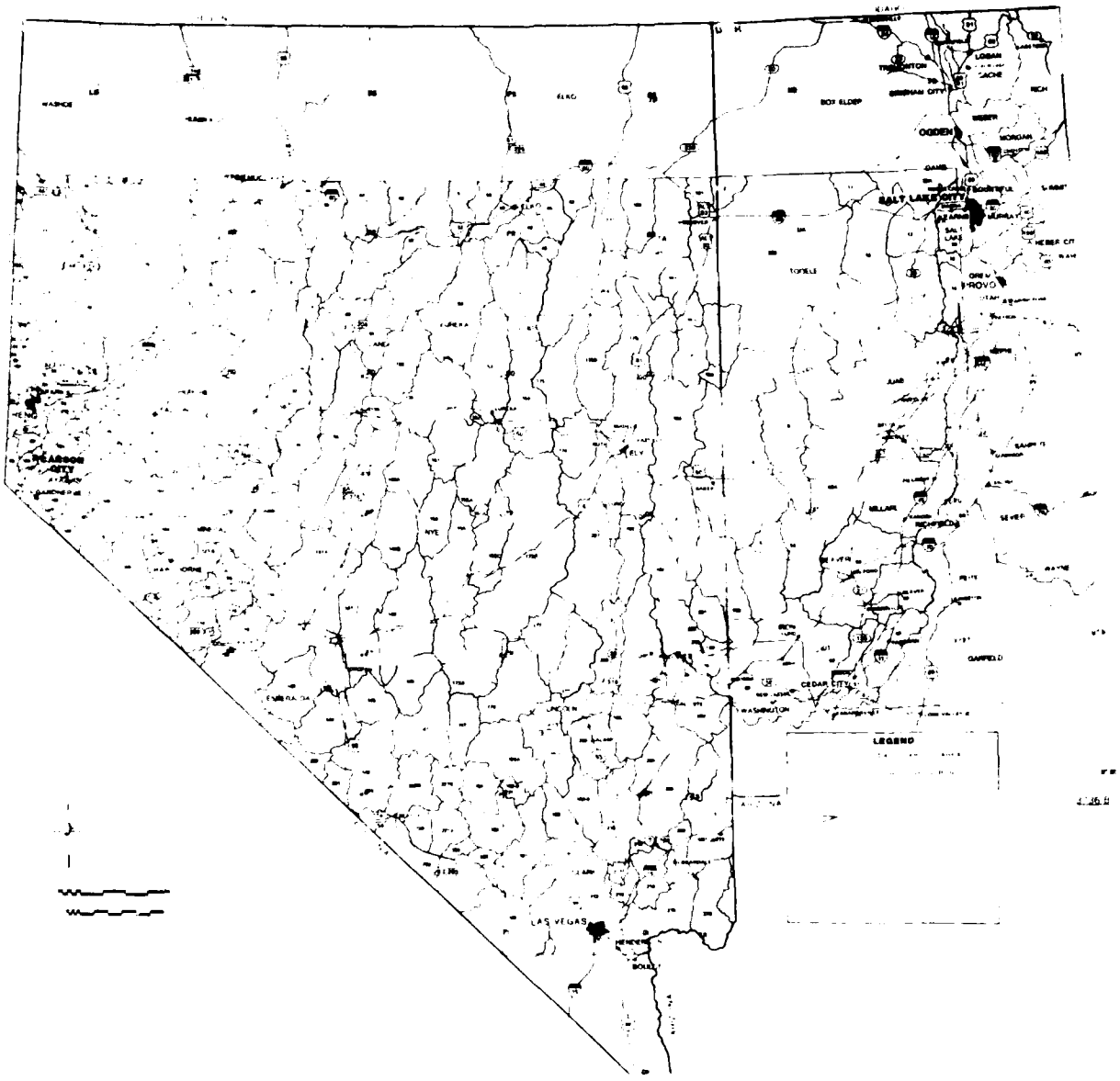


Figure 3.2-8. Existing transmission lines in the Nevada/Utah study area.

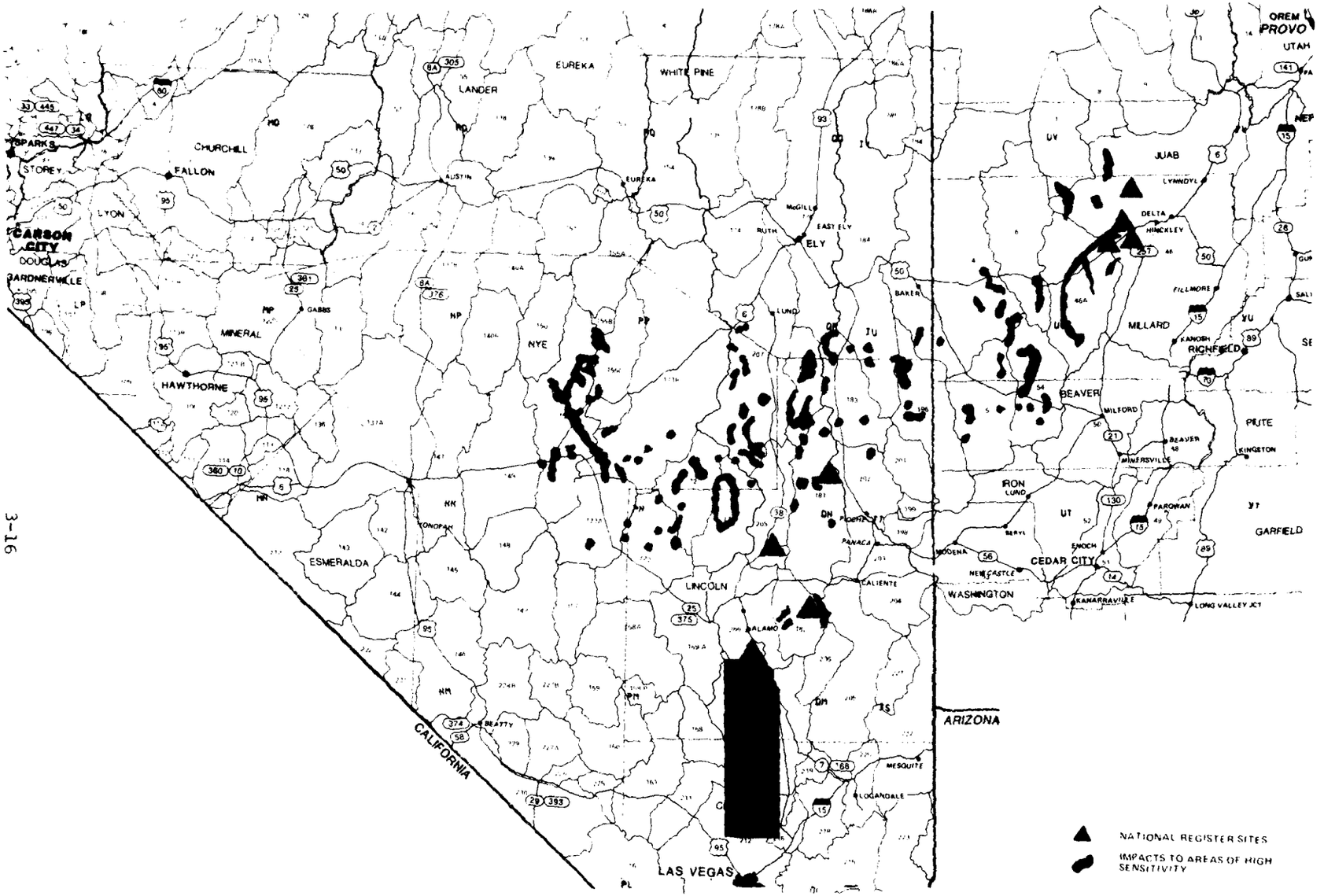


Figure 3.2-9. National Register sites in the Nevada/Utah study area.

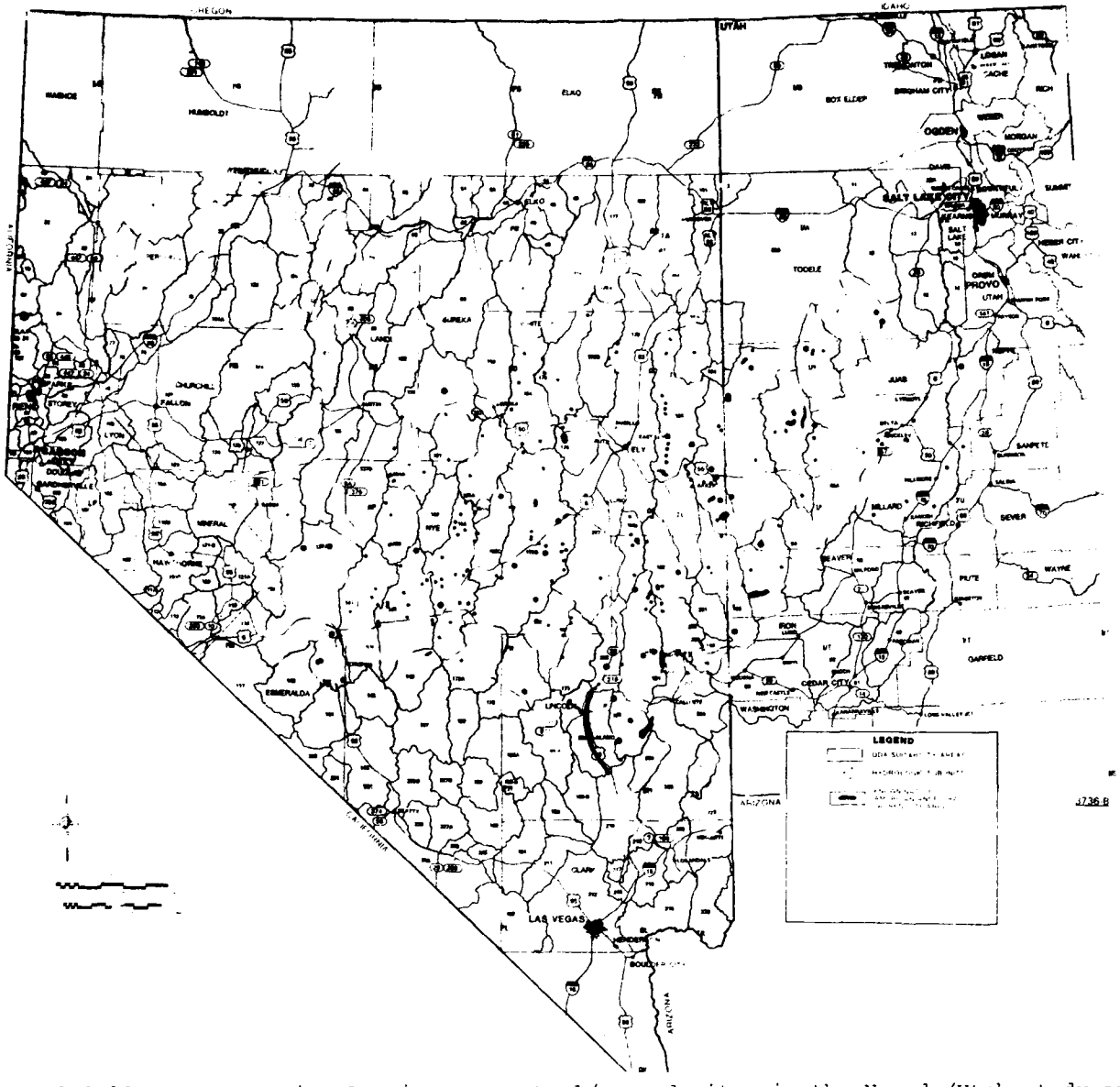


Figure 3.2-10. Known Native American ancestral/sacred sites in the Nevada/Utah study area.

Legal Constraints

Legal constraints represent areas that might be available for M-X deployment although use of the land will require detailed site-specific analysis, fieldwork, and consultation prior to withdrawal/acquisition. Cabinet or congressional level review and approval might be necessary in some cases while coordination with other governmental agencies is required in all cases.

- Federally Listed Threatened and Endangered Plants, Animals, and Fish

  Endangered Species Act (P.O. 93-205) requires (sec. 7) all federal agencies to ensure that actions they authorize do not jeopardize their existence or habitat(s). The most recent publication includes the Utah prairie dog, bald eagle, peregrine falcon, and federal and endangered fish (May 20, 1980 at 45 Fed Reg. 33658). There are no federally listed threatened and endangered plant species in the Nevada/Utah study area. The Beaver Dam Slope desert tortoise population in southwestern Utah has recently (Aug. 20, 1980) been designated a federally listed threatened species with critical habitat.

- State Listed Threatened and Endangered Plants, Animals, and Fish

  The states have recognized the potential value and rarity of a number of plant, animal, and fish species by listing them. These occupy severe or unusual habitats and are therefore likely candidates for (a) having medicinal or other value to man and (b) being sensitive indicators to ecosystem health for this particular region, and (c) unique gene pools. There are a number of examples of both phenomena. The desert tortoise is also listed by Nevada state law as a rare animal (the state equivalent of a federal listing of threatened). The gila monster listed by Nevada as a state rare animal, also are a large reptile often collected for resale and have declined throughout their range. They are a venomous lizard (one of only two in the world) and sometimes are persecuted by humans.

- Federally Recommended Threatened and Endangered Plants, Animals, and Fish

  The population levels of these organisms are very low and current land use threatens their continued existence. The nine most clearly threatened plants species of the area have been listed on the Federal Register and appear very likely

to be incorporated in the federal list of endangered species according to the regional Fish and Wildlife Service biologist. They will then be afforded the same status as listed species. Guiliani's dune scarab beetle was listed (1978) as proposed for endangered species designation, known to exist only on Big Dune near the Nevada-California border, and highly susceptible to human disturbance.

- Registered Archaeological and Historic Properties (see Figures 3.2-9 and 3.2-10)

  Properties listed in the National Register of Historic Places are protected by federal legislation (National Historic Preservation Act, Executive Order 11593, NEPA) and such sites have been avoided as an initial means of reducing impacts. It is recognized that additional National Register eligible properties will be discovered as intensive archaeological surveys are continued in the study area. These will also be avoided to the maximum degree reasonable.

- Air Quality Nonattainment Areas

  Section 107(a) of the 1977 Clean Air Act Amendments (CAAA) mandates each state to submit to EPA a list of those air quality control regions, or portions thereof, which do not meet any national primary or secondary air quality standards. Section 110 requires each state to submit a plan which provides for implementation, maintenance, and enforcement of any primary and secondary standards in each air quality control region (or portion thereof) within each state.

  Several areas within Nevada and Utah do not meet one or more of the air quality standards, especially as a result of urbanization or mining operations. M-X siting decisions within these areas will have to meet more stringent pollutant control measures consistent with an EPA approved state implementation plan.

- Class I Air Quality

  In Section 169A of the 1977 Clean Air Act Amendments (CAAA), Congress declared a national goal to prevent any future, and to remedy any existing impairment of visibility and to prevent any reduction in air quality related values in mandatory Class I areas. Section 162 established certain mandatory Class I areas (all international parks, national wilderness areas larger than 5,000 acres, national memorial parks larger than 5,000 acres, and all national parks larger than 6,000 acres) while Section 164(d) required federal land

managers to review all national monuments, primitive areas, and national preserves for redesignation as Class I where air quality related values are important attributes. Three Class I areas exist in Utah to the east of potential siting areas. If potential wilderness areas become designated wilderness areas they will be afforded Class I protective status thus acting as a constraint on M-X siting decisions.

- Prime and Unique Farmlands

  By memorandum, the CEQ has clarified the inclusion of highly productive farmlands within the NEPA policy of preserving important historic, cultural, and natural aspects of the national heritage. Prime and unique farmlands should not be used for any purpose other than agriculture unless other national interests override the importance of preservation of prime or unique farmlands. These lands are identified by the Soil Conservation Service and have soil, water, and climatic conditions that make them capable of prime crop production or able to produce unique crops.

- Paleontological Resource Areas

  Utah is the only state in the nation with a law mandating the preservation of paleontologic resources (State Antiquities Act, 1977 *Utah Code Annotated*, Chapter 163, Section 63-18-18 to 31). Some protection is also afforded under the Federal Antiquities Act. Areas identified as having a high value, primarily vertebrate fossils but also other key or well preserved fossils, would be avoided or mitigated by collection and preservation.

- Designated Groundwater Basin

  In Nevada the state engineer, either by petition from 40 percent of the appropriators on record in a designated area, or on his own motion, may exercise supervision of a groundwater basin in a designated area (Nev. Rev. Stat. Section 534.030 (1975). In order to protect vested water rights, and to provide a means for ensuring that water will be dedicated to its most beneficial use, Utah employs an application and permit system similar in design to that in use in Nevada (Utah Code Ann. Section 73-3-8 (1979).

Policy Constraints

Policy constraints are areas in addition to legal constraints where the Air Force has promised to minimize direct impacts to the maximum degree consistent with achieving project objectives.

- Private and State Owned Lands, Agricultural Land

  These land ownership and use categories are relatively rare throughout the western United States and particularly in the Nevada/Utah study area. Except for locating the operating base, almost all of these lands should be avoidable with minimal impact on deployment. However, avoidance of state land is particularly difficult in Utah where four sections in every township are state owned. The need to site the operation base at the periphery of the deployment region indicates siting near Beryl, Milford, or Delta, Utah. All of these communities are surrounded by private agricultural lands and complete avoidance of direct conflicts does not appear possible. To the degree possible, it is Air Force policy to avoid direct impacts on private and state owned lands or on agricultural lands.

- Roads and Highways

  Various criteria for co-use, stand-off, and exclusion of roads are being utilized in system layouts. The criteria generally vary with the project feature and with current average daily traffic (ADT) on the roads. Cluster roads cannot co-exist with or cross federal, state, or county roads with ADT of greater than 250 vehicles per day. The designated transportation network (DTN) will not co-exist with federal, state, or county roads unless terrain such as mountain passes dictate the need to co-exist, or when it is economically impractical to do otherwise.

Environmental Constraints

Environmental constraint areas are available for M-X deployment although available data indicate important environmental resources interact with potential project features. Several of these features are widespread and complete avoidance is not practical. These interactions are further discussed in the EIS.

- Pronghorn Antelope Range

  Although overall range and distribution contains the key habitat, pronghorn antelope range is ranked lower than key habitat and migration routes because they contain smaller populations.

- Mule Deer Migration Routes

  Mule deer migration routes tend to occur in passes between valleys which are likely to be used by the DTN. At times of migration (rut and fawning) the animals are the most sensitive and are located in these natural funnels.

- Mule Deer and Elk Key Habitat

  Mule deer key habitat or winter range typically represents the lowest elevational extremes of the year-long range and is generally less than two percent of the annual range. On these winter ranges (key habitats) competition for forage resources is most acute, the animals are the most sensitive to disturbance, and the highest mortality occurs. These ranges are generally directly abutting geotechnically suitable areas. Recent research (Lyons, 1980; McNamara, Berwick, and Hillyer, 1980) has shown extreme and deleterious reactions by elk to human presence such as avoidance of roads and compression of feeding areas.

- Significant Research Areas

  Significant research areas are areas where natural processes are allowed to predominate for purposes of research and education. These areas may include (a) typical or unusual faunistic and/or floristic types, associations, or other biotic phenomena, (b) characteristic, outstanding geologic, or aquatic features or processes.

- Natural Areas (See Figure 3.2-1)

  Natural area is a pre FLPMA (Federal Land Policy and Management Act, 1976) term for federally managed reserves representing the nation's natural land and water ecosystems. These were categorized according to intended use into research, outstanding, or primitive areas. With the passage of FLPMA in 1976, it became necessary to re-evaluate these lands for wilderness characteristics according to the new land management regulations. The 22 natural areas in the Nevada/Utah siting region failed to meet wilderness standards but have retained their natural area designation.

Zeolite Deposits

Zeolites are minerals formed by alteration of pyroclastic volcanic rocks. Certain types of zeolites, those with fibrous crystalline habit similar to asbestos, are suspected of being cancer-causing. Identified areas of zeolite occurrence could require avoidance, special dust prevention measures, or personnel protection devices (face masks). See ETR 11 - Environmental Characteristics of Alternative Designated Deployment Areas: Geology and Mining for more detailed information.

3.3 APPLICATION OF CRITERIA

Figure 3.3-1 shows exclusions and Figure 3.3-2 illustrates constraints applied to the Nevada/Utah deployment area. The combination of exclusions and constraints is mapped on Figure 3.3-3. A Nevada/Utah conceptual layout is superimposed on Figure 3.3-4. Following a similar process, a conceptual layout for the Texas/New Mexico region is shown in Figure 3.3-5. There is more suitable land available than is required for system deployment. Therefore, judgments had to be made as to which portion of the suitability zones should be selected for potential siting. Some of the fundamental guidelines used to select the deployment areas were (1) compactness, (2) supportability from nearby operation bases, and (3) deployment in at least two states.

Compactness

A compact deployment area is desirable, because the road network would be shorter. Cost of roads, amount of disturbed area, number of field facilities, and the number of people to operate and maintain the system would be minimized. A compact deployment area also contributes to improved security, better maintenance, and a higher in-commission rate due to shorter travel distances for missiles and personnel. Another benefit of deploying in a small area is that SAL monitoring by satellites is facilitated and would be a worthwhile precedent should the Soviets deploy a smiliar mobile missile system.

Supportability

The deployment area should be supported by nearby operating bases if possible. Selection of suitable operating base locations is an integral part of system deployment and is discussed in Section 2.1.3.

Deployment in Multiple States

Congress, federal, state, and local leaders have suggested that the system be dispersed over more than one state as a possible mitigation to the rapid influx of large numbers of people into a single area. Therefore, the Air Force has taken this as guidance to mean that the whole system of 200 missiles would not be deployed in a single state. Furthermore, only one of the two required operating bases would be located in any given state.

The tentative system layouts analyzed in this EIS use a mitigation-through-avoidance technique to minimize impact to the environmental features. The process was:

- Preliminary Screening. Application of exclusion criteria described earlier.

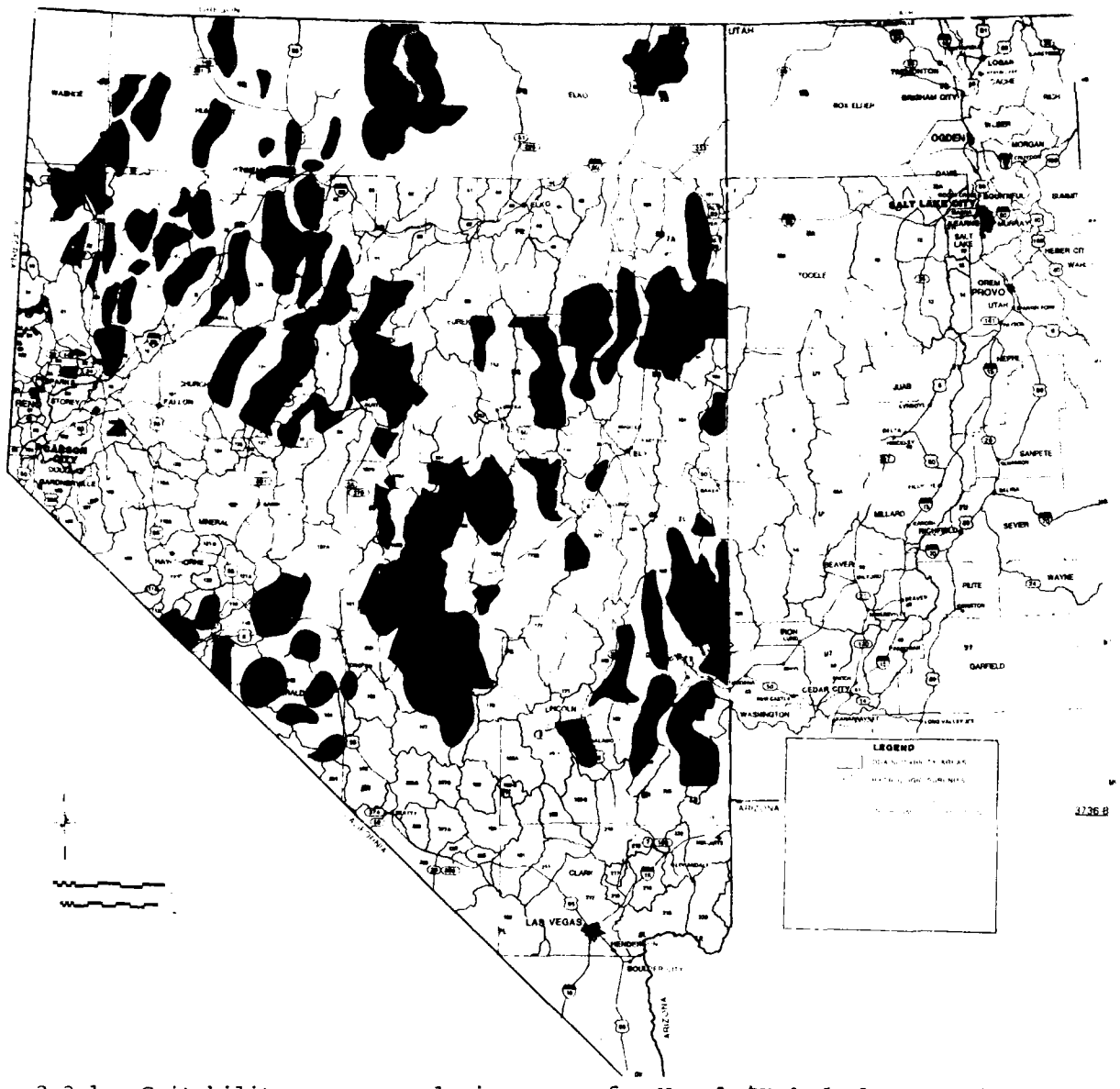


Figure 3.3-1. Suitability zones, exclusion areas for Nevada/Utah deployment alternatives (by hydrologic subunit).

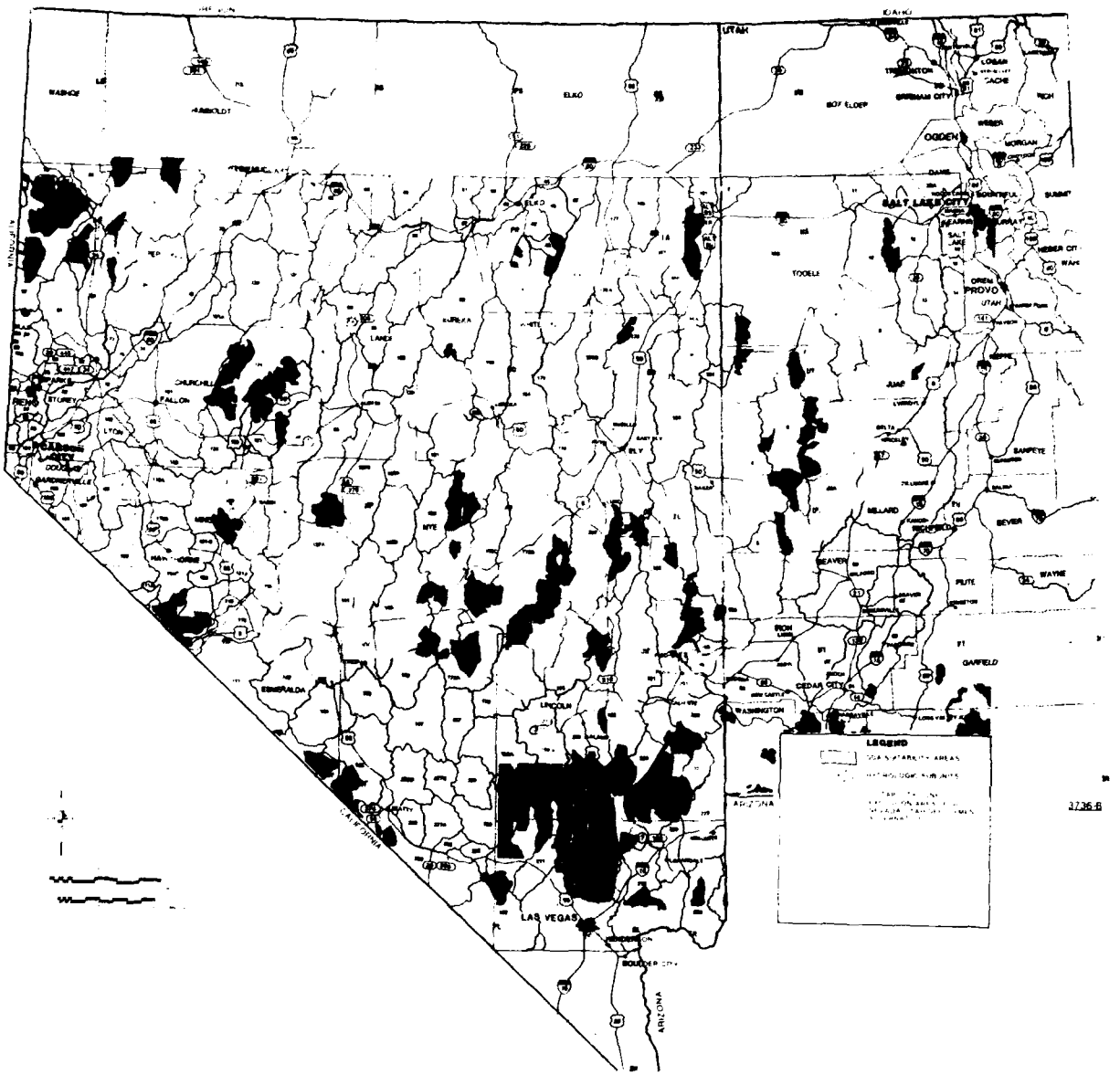


Figure 3.3-2. Suitability zones and exception areas for Nevada/Utah deployment area (by hydrologic subunit).

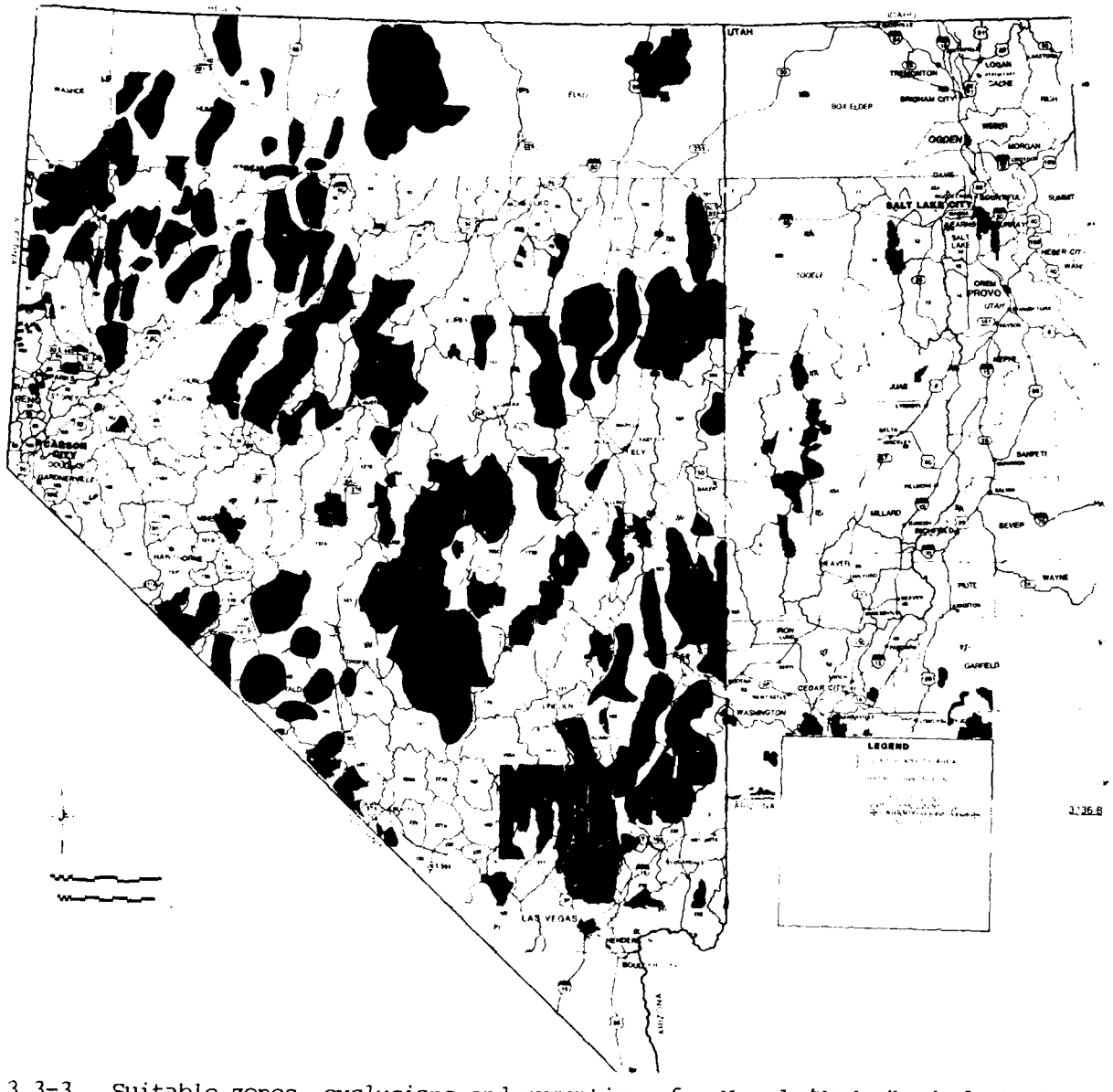


Figure 3.3-3. Suitable zones, exclusions and exceptions for Nevada/Utah (by hydrologic subunit).

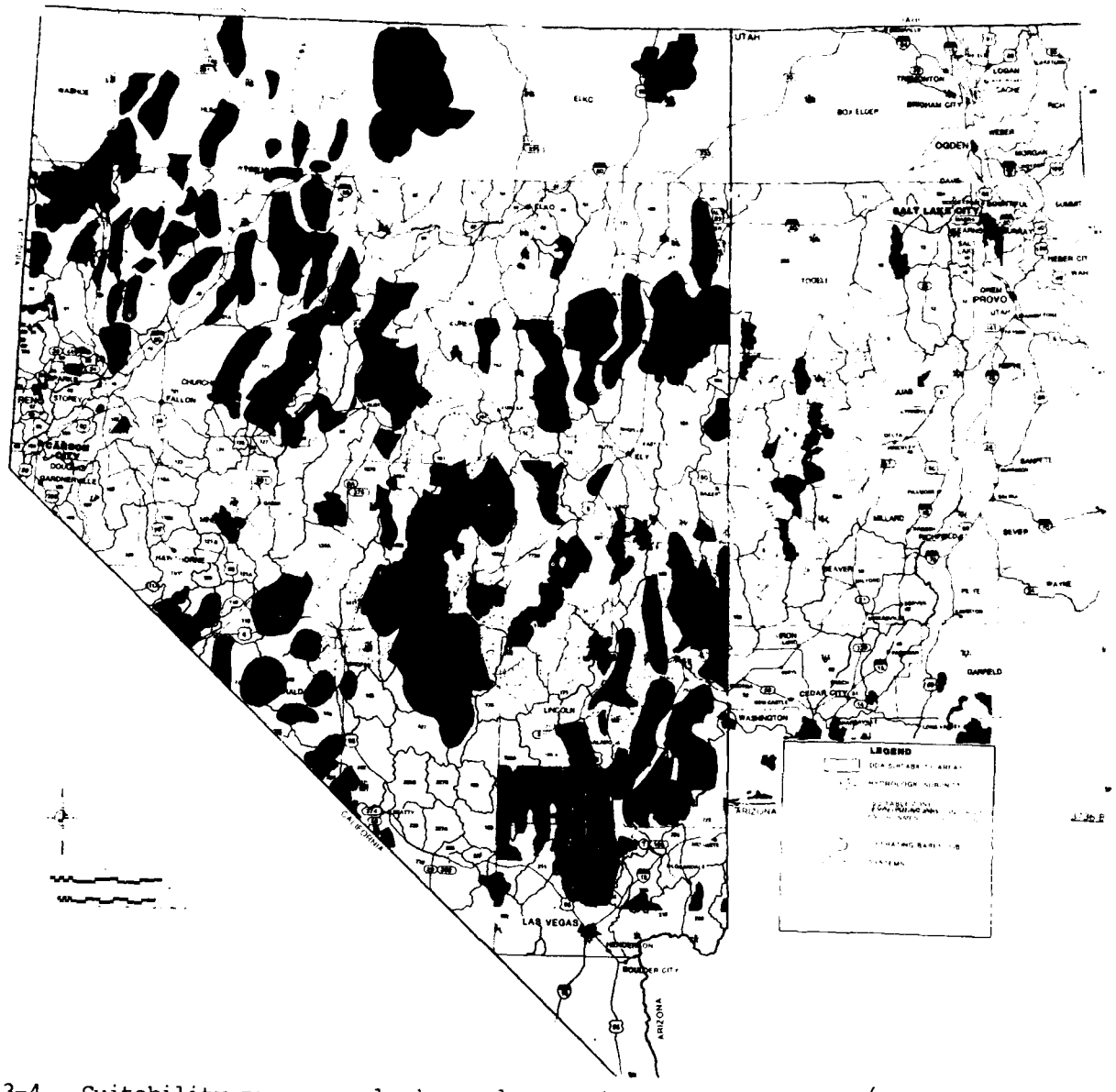


Figure 3.3-4. Suitability zones, exclusion and exception areas for Nevada/Utah deployment alternative.

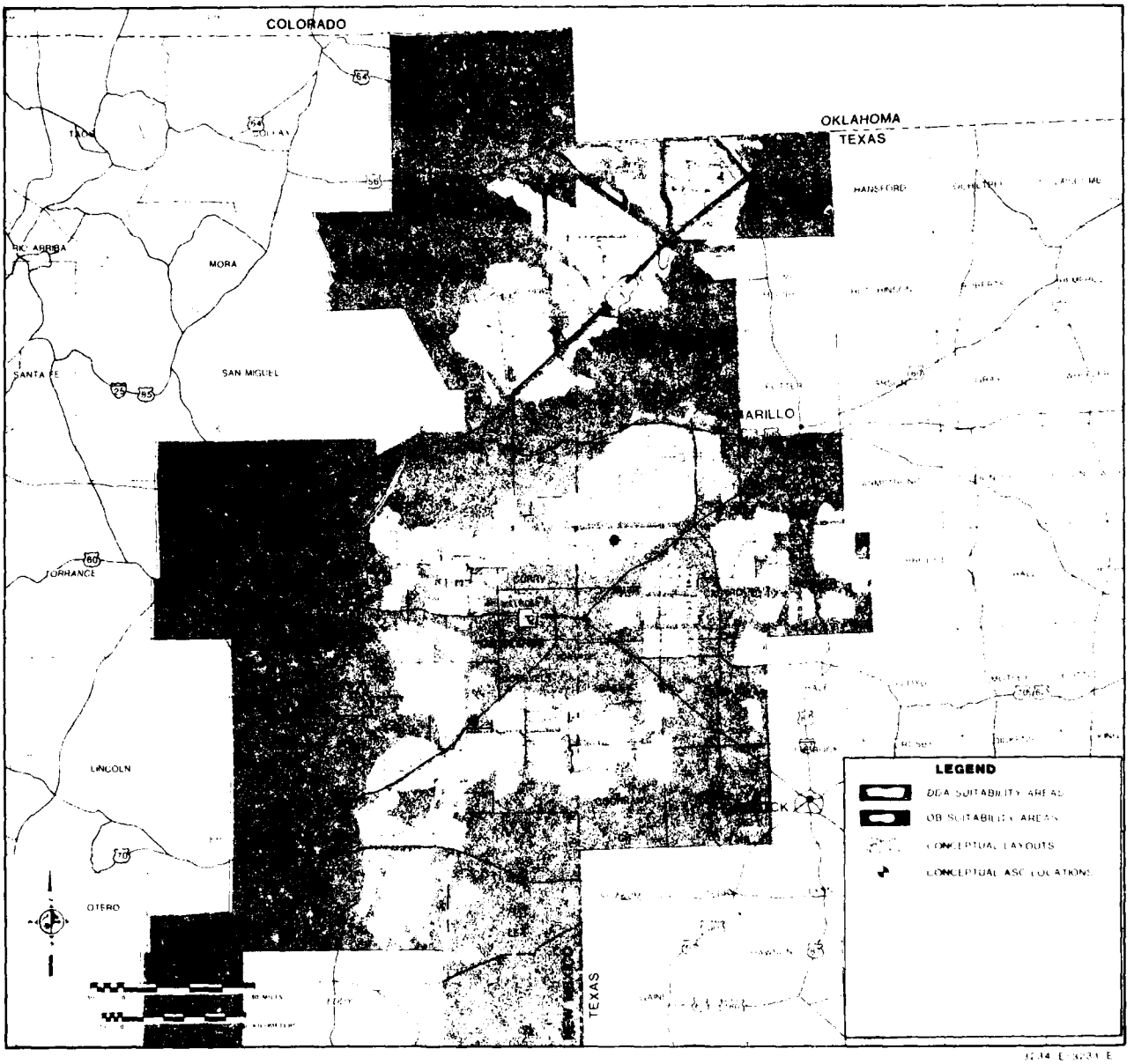


Figure 3.3-5. System layout and suitability zones in the Texas/New Mexico region.

- Disturbed Area Identification. To minimize disturbed land needs within the screened area, roadways with an existing average daily traffic of volume of less than 250 vehicles were mapped and their rights-of-way identified for shared M-X use.

- Preliminary System Layout. The M-X system clusters and roadways were laid out to minimize dispersion and size of the outside extent of the entire deployment area.

- Specific Environmental Features. Mappable sensitive cultural and environmental features not previously excluded in earlier screenings were avoided.

- Refined System Layouts. The roughly known environmentally sensitive areas were overlaid upon the preliminary system layouts and specific shelters, roads, and clusters were moved to avoid conflict and potential impact. The refined layout was designed to reduce overall impacts.

The application of the mitigation-by-avoidance reduces site-specific impacts and valley or county-specific disturbances to known sensitive areas. This reduction of impacts has associated with it two monetary costs: the system expands on the periphery into additional valleys, resulting in higher initial costs and the expanded distances increase Air Force operational costs for both security and maintenance.

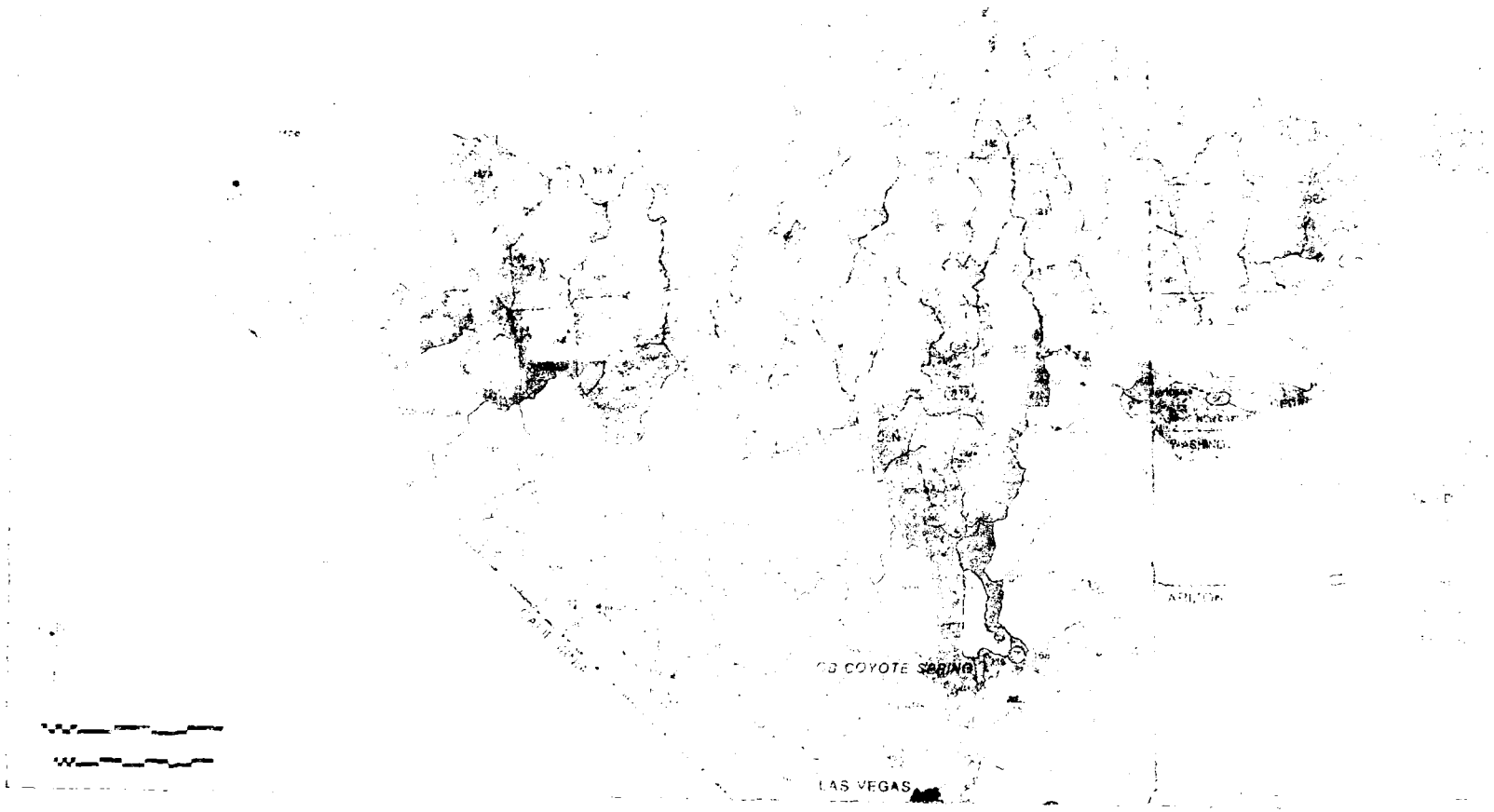
The designated deployment area (DDA) selected for analysis in the Nevada/Utah region is located in the hydrologic units indicated in Figure 3.3-6. Hydrological units are shown because they are the basis of comparative environmental analysis which appears in Chapter 2 of the EIS.

The northwestern portion of Nevada was not selected as an alternative, because of depth to water table uncertainty, more severe climate and increased DDA area road network, personnel requirements, and construction/operations costs.

Figure 3.3-7 shows the DDA selected for analysis in Texas/New Mexico. Similar reasoning to that used for Nevada/Utah was used for its derivation. Counties are the basic unit for environmental analysis in Texas/New Mexico.

Split Basing

Conceptual layouts shown to this point have been for deployment of the full system in each region--either Nevada/Utah or Texas/New Mexico. Another viable alternative, though of higher monetary cost, is split basing which could possibly mitigate impacts. Therefore, a split basing alternative was developed for analysis as shown in Figure 3.3-8.


COYOTE SPRING
LAS VEGAS

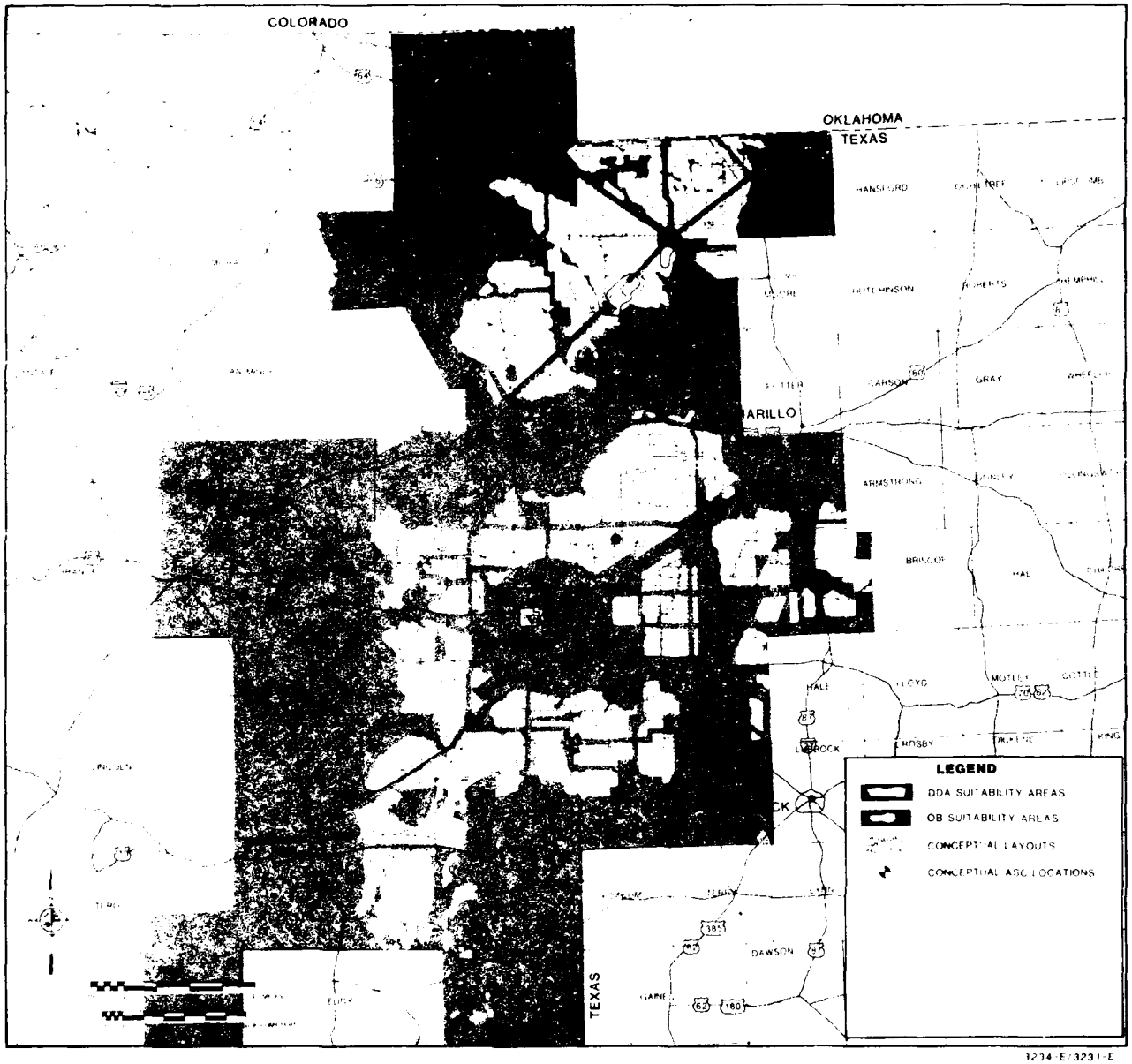


Figure 3.3-7. Suitability zones, exclusion and exception areas for Texas/New Mexico deployment alternative.

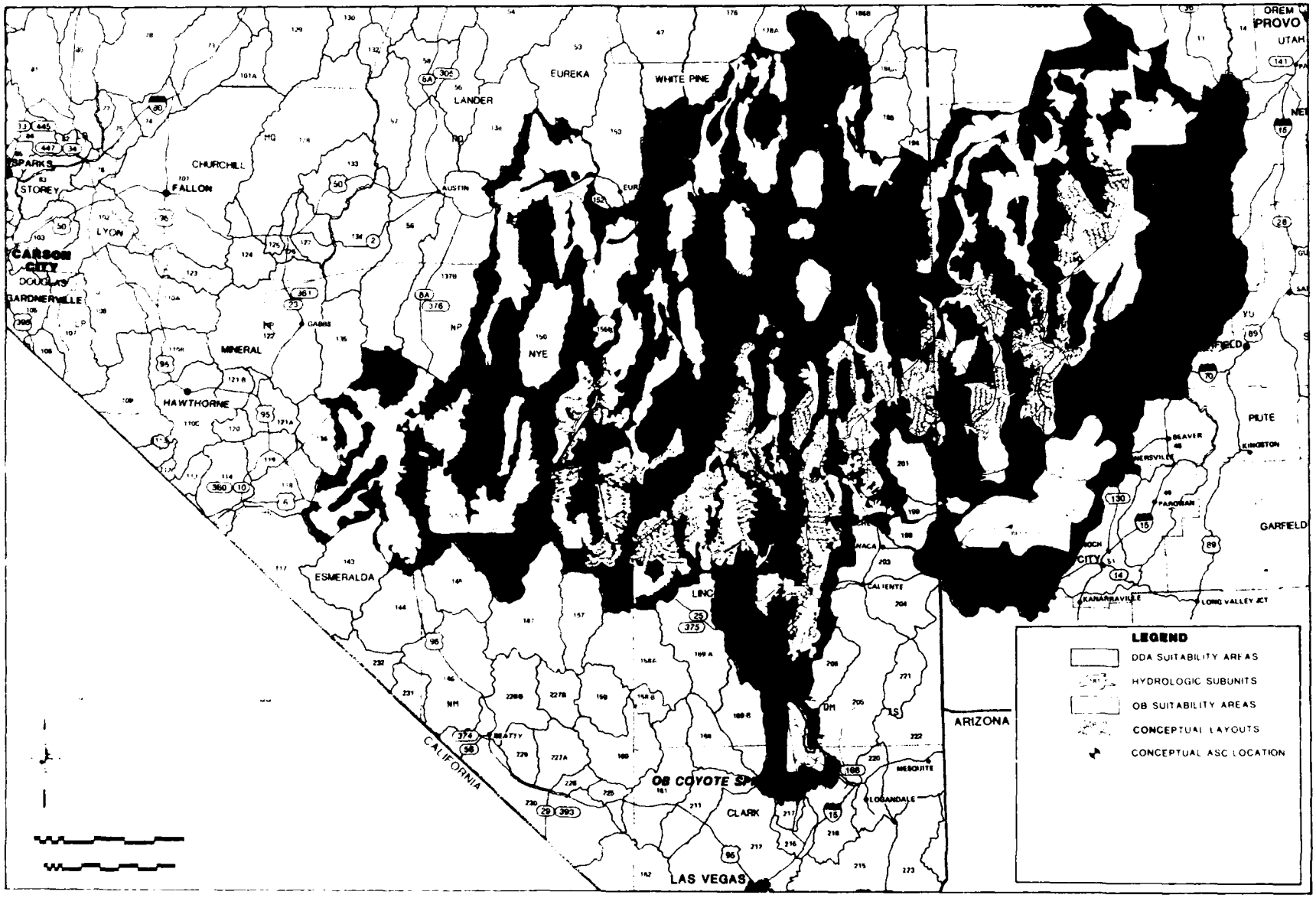


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Figure 3.3-8. Split basing alternative; Nevada/Utah.

For split basing alternative, 100 missiles would be deployed in each of the two regions with approximately 70 missile clusters in Nevada, 30 in Utah, 65 in New Mexico, and 35 in Texas. For Nevada/Utah the number of missiles in each state was halved in comparison to the full basing options which would locate 200 missiles in that region. The intent was to provide equal mitigation to each state.

For Texas and New Mexico, the split-basing deployment area was derived principally by maximum avoidance of inhabited dwellings and as much irrigated cropland as possible in hopes that would create the least adverse impact for the region.

3.4 SUITABILITY ZONE FOR DDA

As a result of the application of the DDA siting criteria and accompanying analysis discussed in Section 3.3, the land which is considered suitable for locating the M-X weapon system, in the Nevada/Utah and/or the Texas/New Mexico candidate deployment region, was determined.

There is more suitable land available than is required for system deployment. Therefore, judgment based on operational considerations, as well as others, had to be made as to which portion of the suitability zones should be selected for potential siting.

As illustrated in Figures 3.4-1 and 3.4-2, within each suitability zone a potential, DDA network of protective shelters, DTN and ASCs are conceptually located to demonstrate the ability to satisfy the various criteria of geotechnical suitability, protective shelter spacing, safety distances, DTN access, etc. However, this tentative DDA layout is illustrated to demonstrate only one potential layout which satisfies the DDA siting criteria. Numerous variations of the potential layouts exist within each DDA suitability zone.

With the further site-specific planning, engineering, and environmental studies to be conducted during Tier 2, 3, 4, etc. analysis (see DEIS Chapter 1, Section 1.7), the conceptual DDA layout could change.

For instance, a site specific study which may identify a point obstacle of significant environmental impact which could be mitigated or an engineering/construction problem resolved, by shifting the proposed site of a protective shelter or a segment of the DTN within the suitability zone. In the event of a serious conflict an entire cluster of protective shelters could be eliminated from a particularly sensitive area and relocated or redistributed within the suitability zone. However, for purposes of this EIS, no system component would be sited outside of the DDA suitability zone.

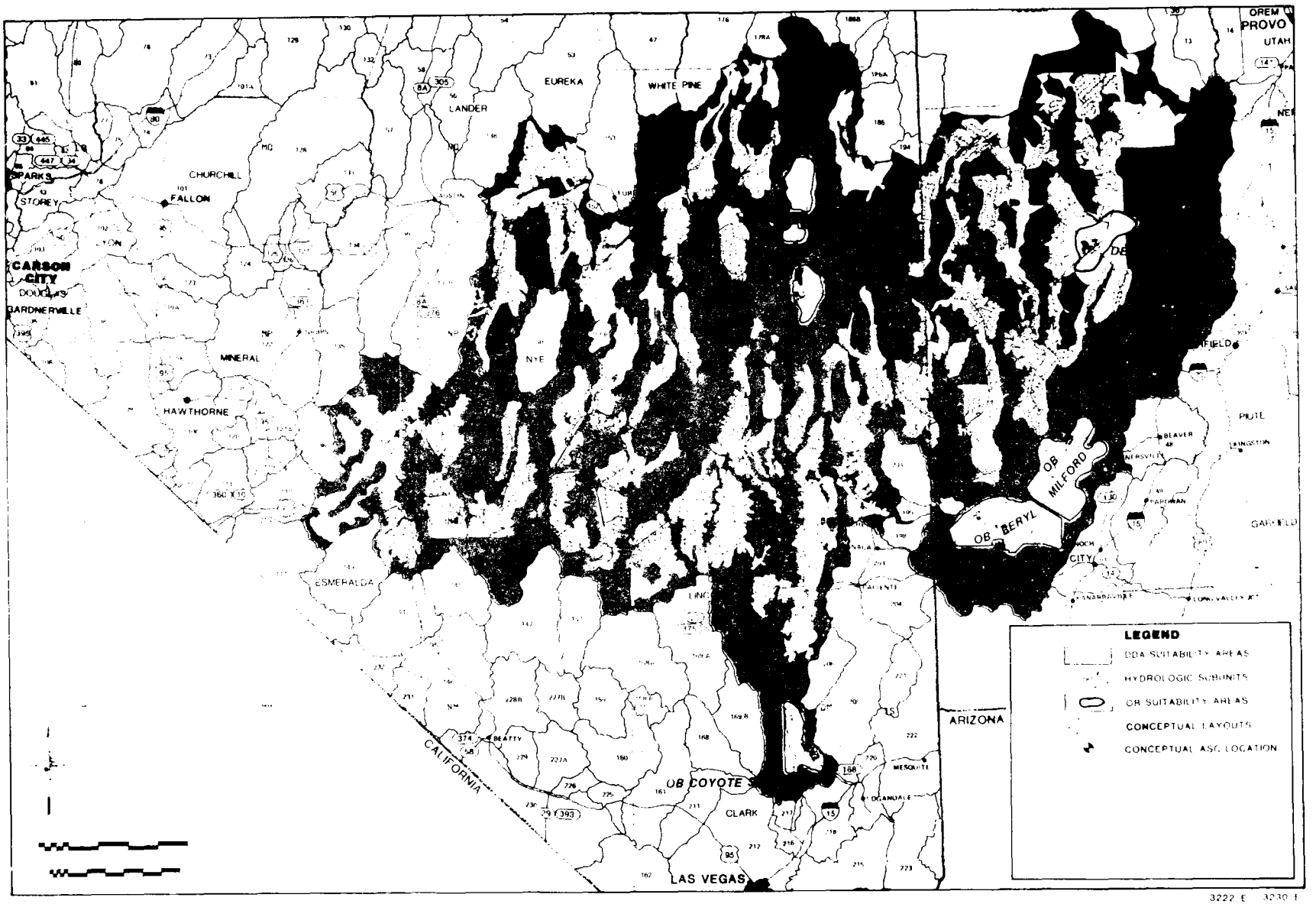


Figure 3.4-1. Counties within Nevada/Utah designated deployment area.

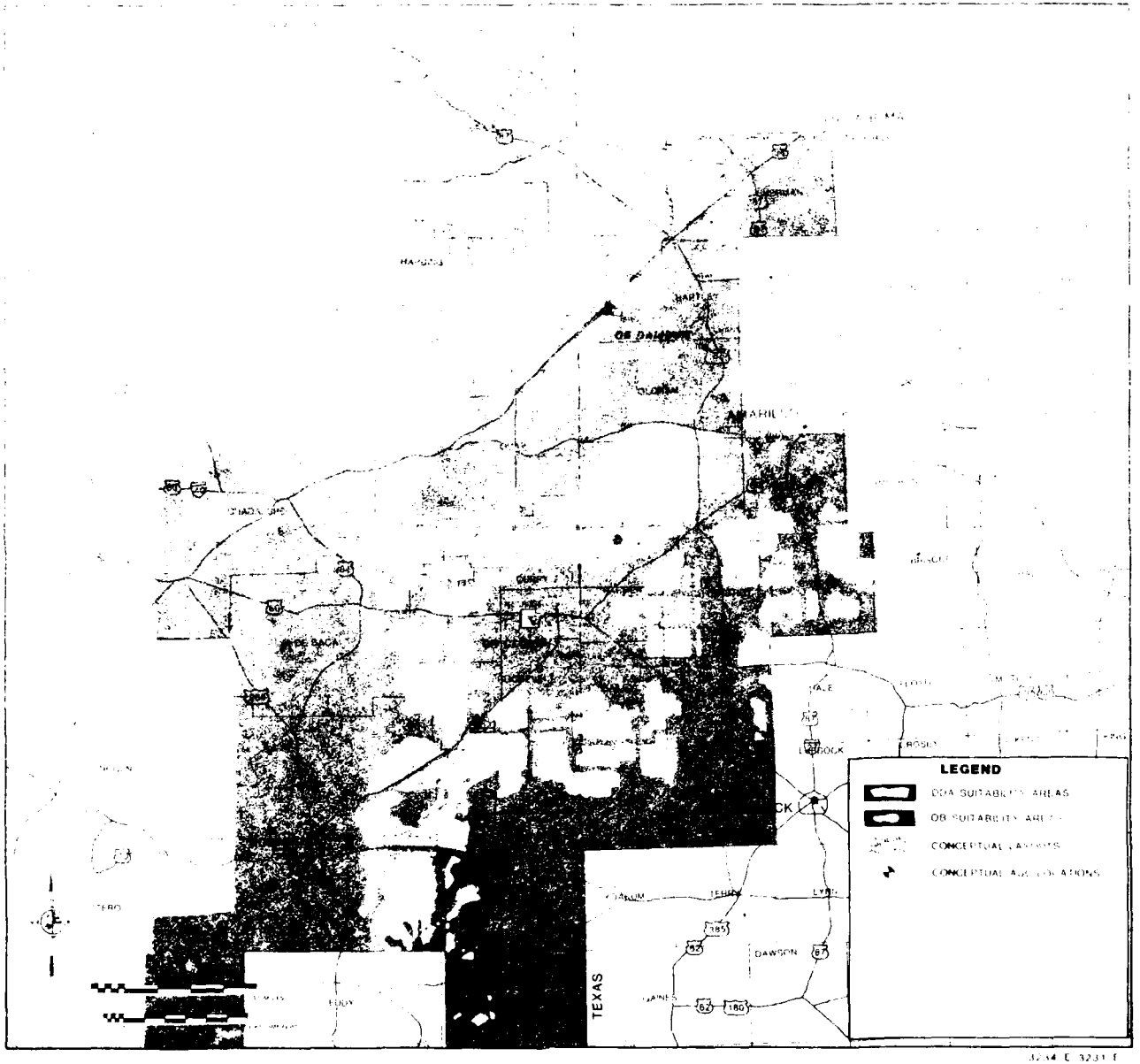


Figure 3.4-2. Full basing, Texas/New Mexico.

For purposes of environmental analysis, to facilitate locational reference, existing geographical boundaries are identified in each of the candidate deployment regions, within which the DDA suitability zones are located. In the Nevada/Utah area, hydrological subunits are used as the geographical reference unit.

The hydrological subunits which contain portions of the DDA suitability zone are aggregated to facilitate identification of the general outer reference boundary or shape of the DDA as can be seen in Figures 3.4-1 and 3.4-3.

In the Texas/New Mexico area, geotechnically suitable land plus county units define the general outer reference boundary or shape of the DDA as can be seen in Figure 3.4-2.

3.5 AREA SUPPORT CENTER SITING CRITERIA

The locations of the area support centers (ASCs) are determined by three functional criteria and one socioeconomic criterion. To some extent, the locations of the ASCs interact; that is, because of their functional requirements, the location of a given ASC is influenced by the locations of the others.

The ASC functions that influence siting are their use as:

- Dispatch center for helicopter-borne security forces
- Dispatch centers for maintenance and security personnel using ground vehicles
- Overnight parking sites for the special transport vehicle to provide security for the missile/launcher in transit between the DDA and the DDA clusters.

Additionally, ASC siting is influenced by the Air Force's objective of employing as many civilian personnel as possible throughout the M-X deployment area. Consequently, sites within reasonable commuting distance of existing towns are desirable.

For security response by helicopter, a given ASC must be within 65 mi (Figure 3.5-1) of the facilities (shelters, remote surveillance sites, etc) for which it is assigned primary security responsibility. (This distance allows security forces to arrive via helicopter within no more than 30 minutes of an alarm.) The set of ASCs within a deployment area must be sited so that there are no gaps in this coverage. Moving an ASC may thus result in moving another to provide complete coverage within their corresponding 65 mi radii.

Thirty minute flight time rings from ASCs for Nevada/Utah are depicted by Figure 3.5-2 and ASC flight and transit coverage for Texas/New Mexico full basing is depicted by Figure 3.5-3 and split basing by Figure 3.5-4.

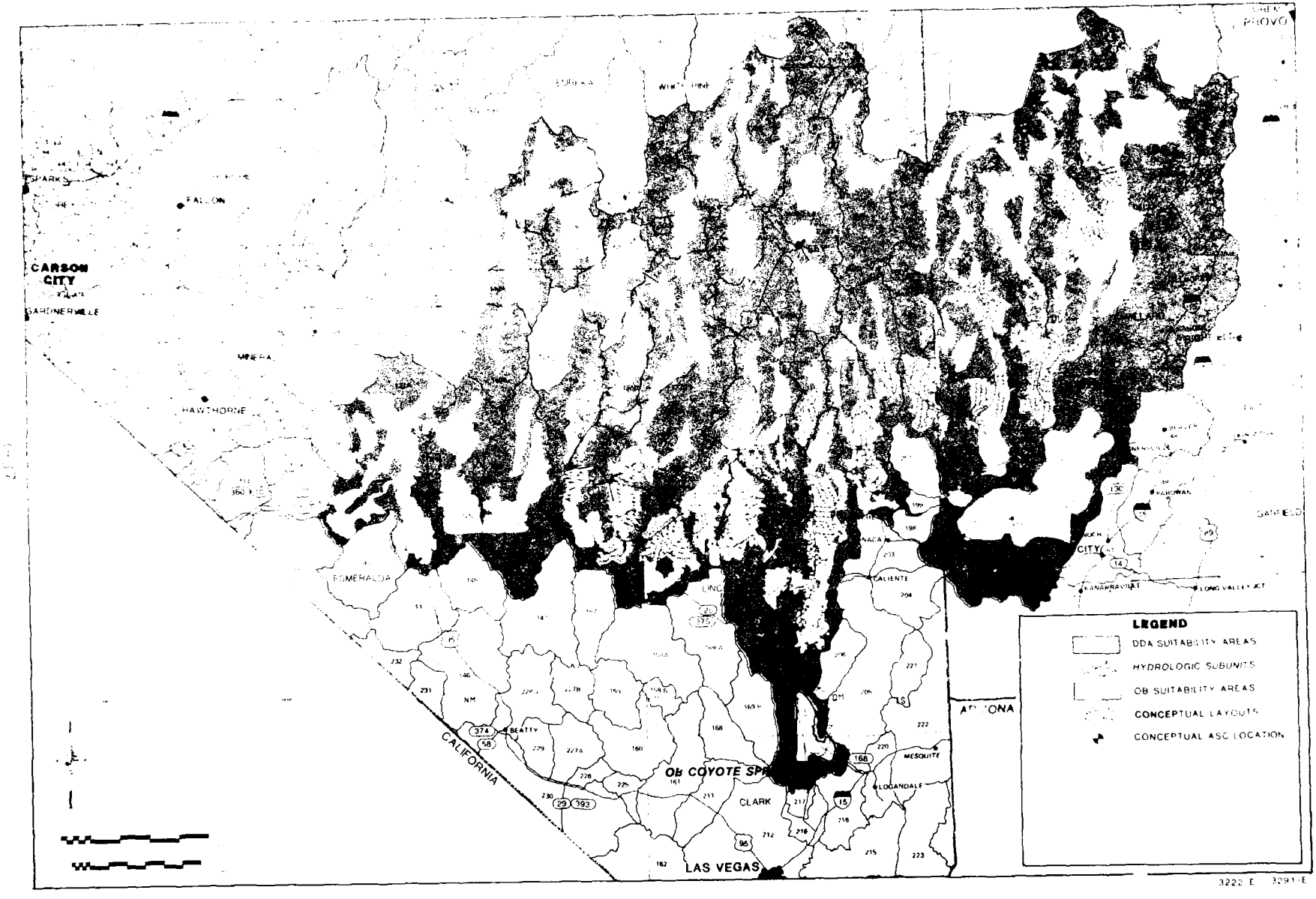
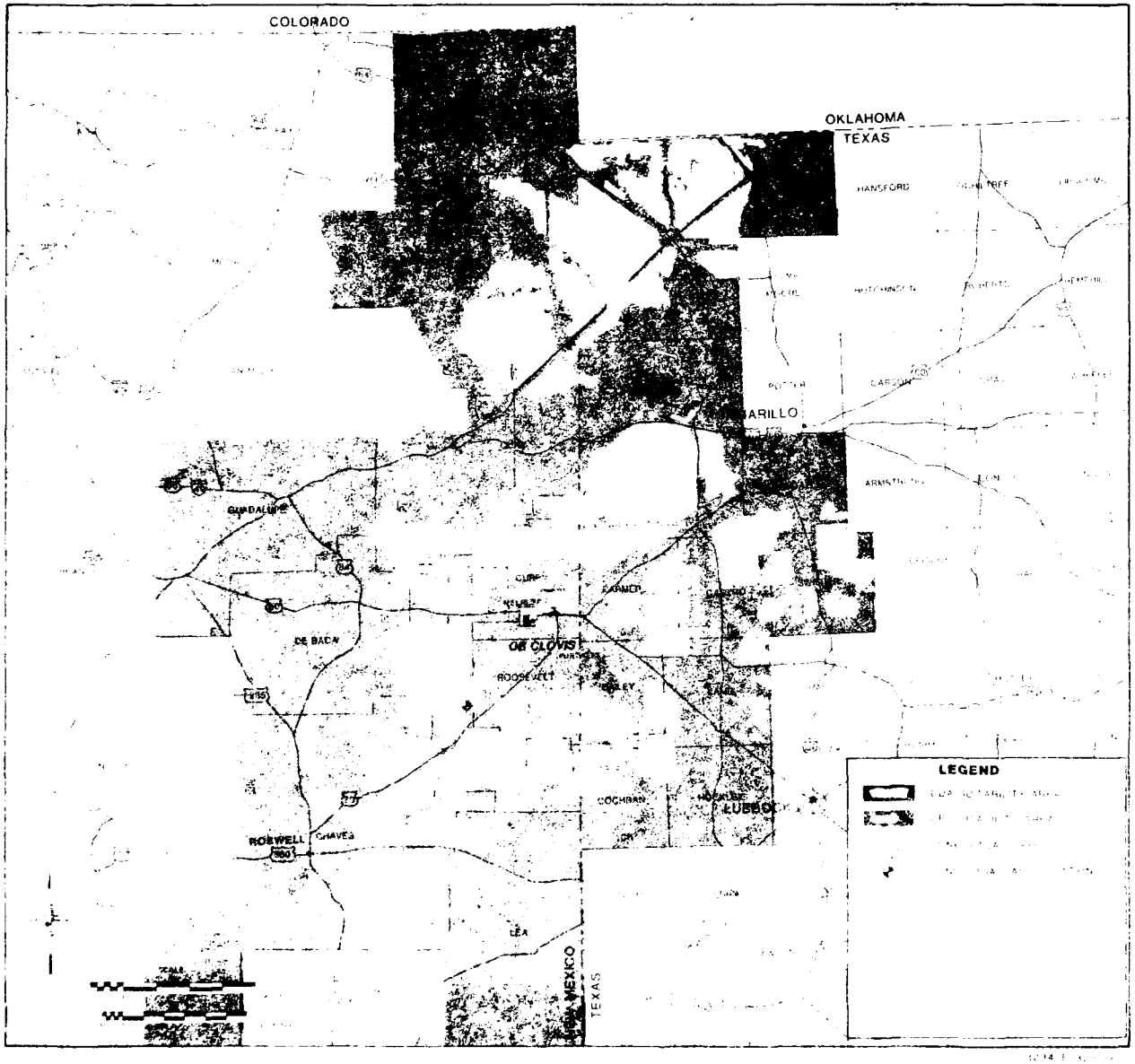


Figure 3.4-3. Split basing, Nevada/Utah.


COLORADO
OKLAHOMA
TEXAS
HANSFORD
ARILLO
GUADALUPE
DE BACA
CURRY
ROOSEVELT
CLOVIS
CROSBY
COCHRAN
LUBBOCK
ROSWELL
CHAVES
LEA
NEW MEXICO
TEXAS
LEGEND

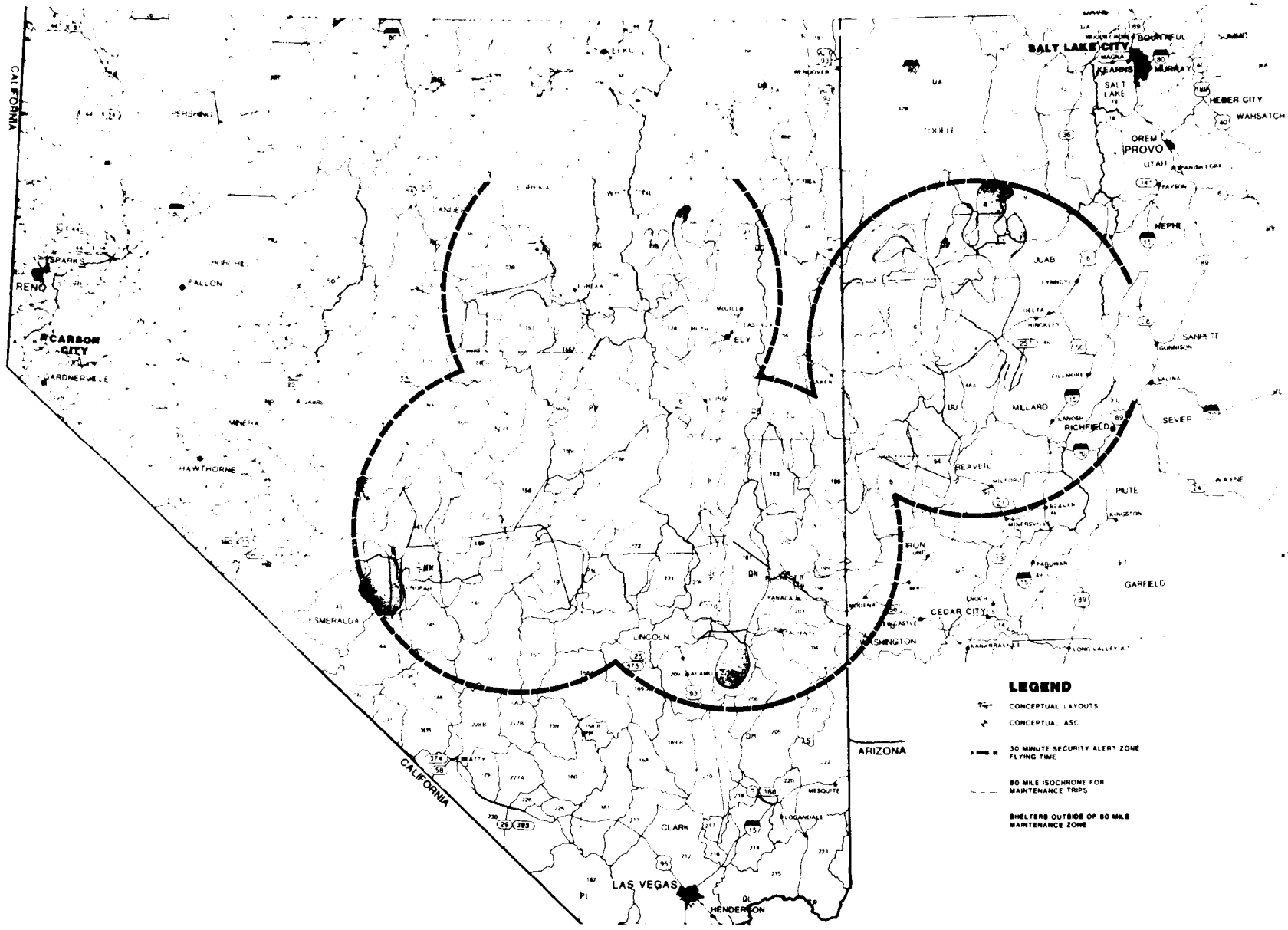


Figure 3.5-1. Isochrones showing 80-mi arrival time to cluster facilities. (Full basing)

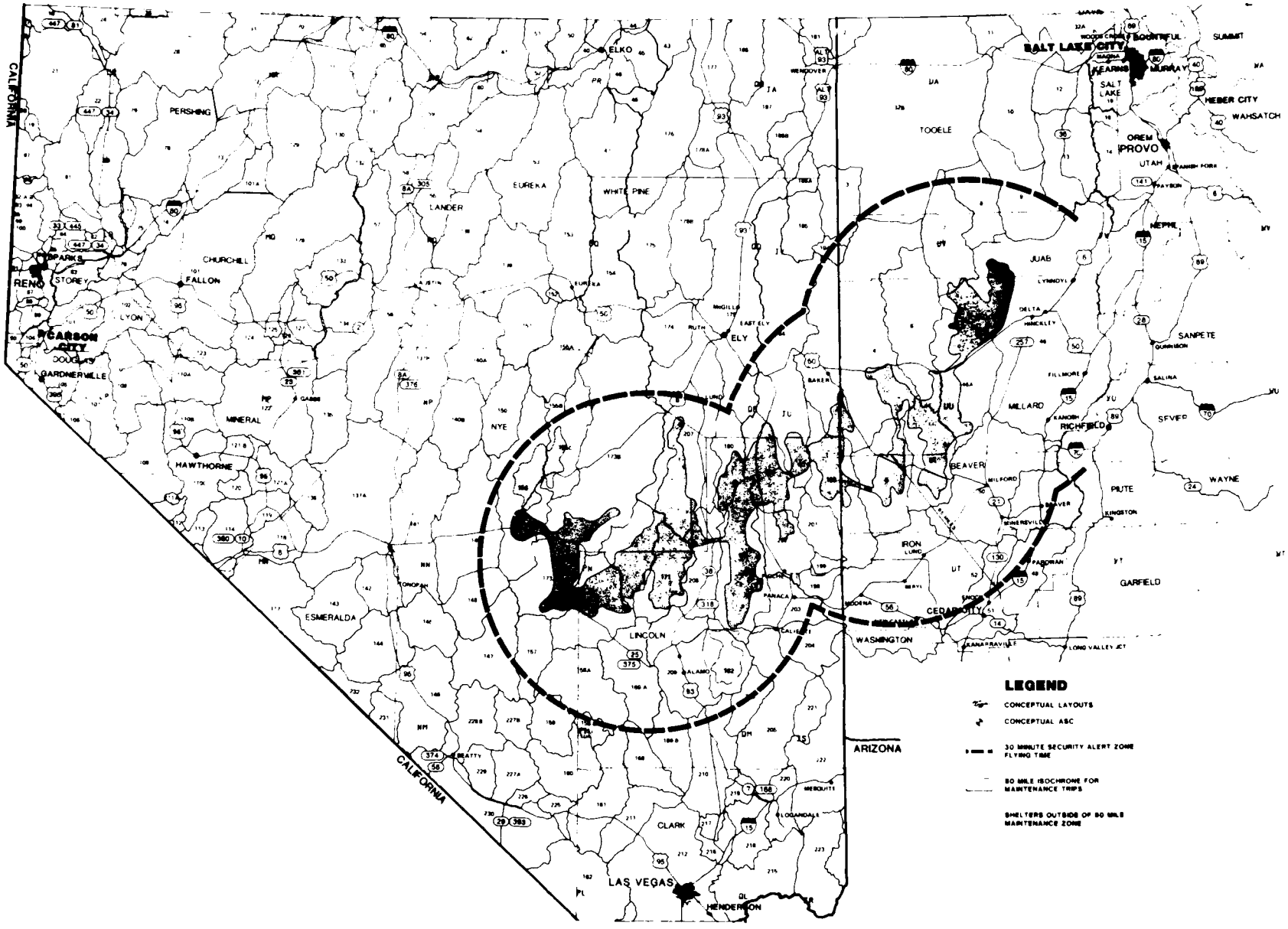


Figure 3.5-1a. Isochrones showing 80-mi arrival time to cluster facilities. (Split basing)

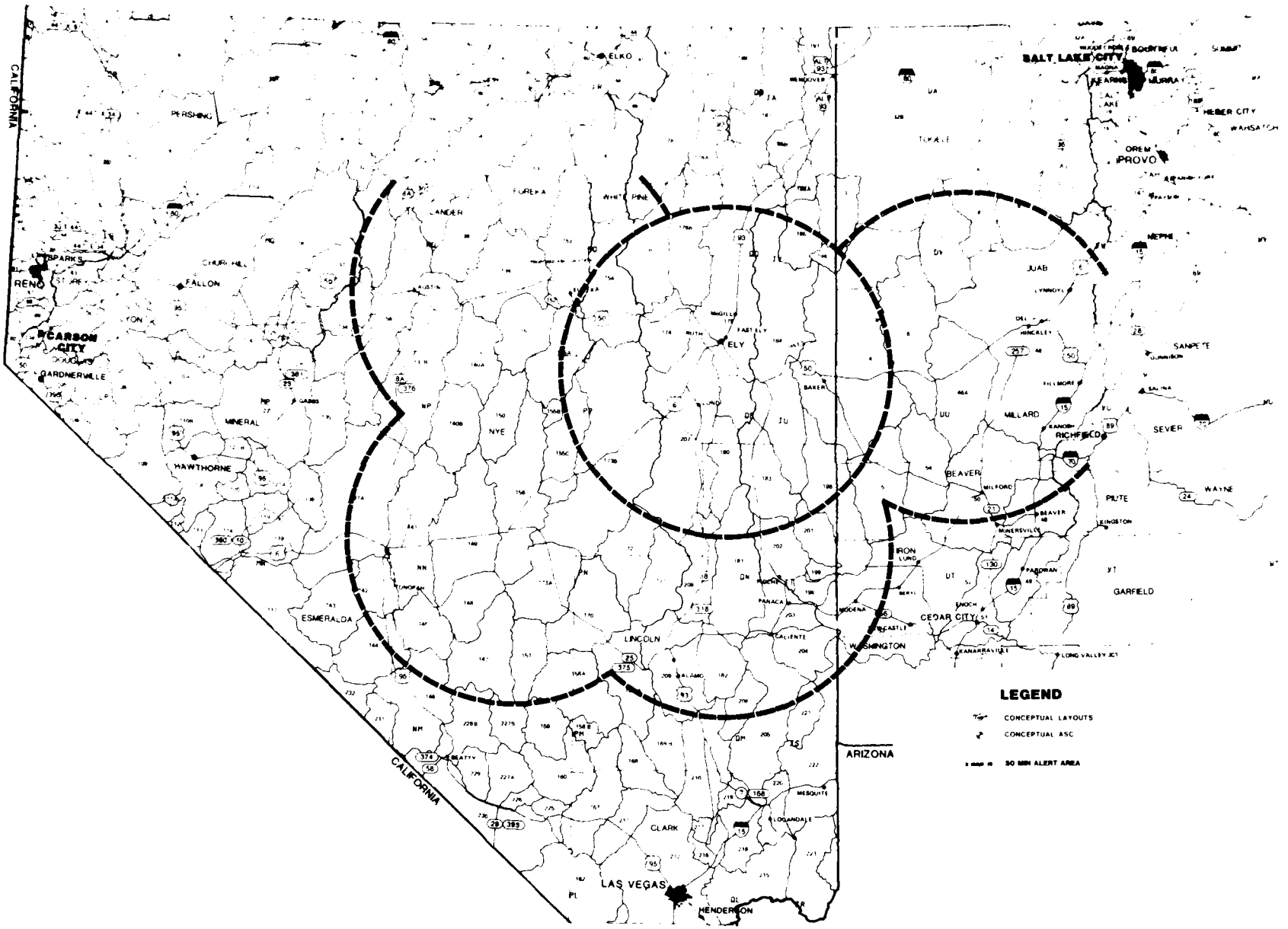


Figure 3.5-2. ASC flight time, 65 air miles.

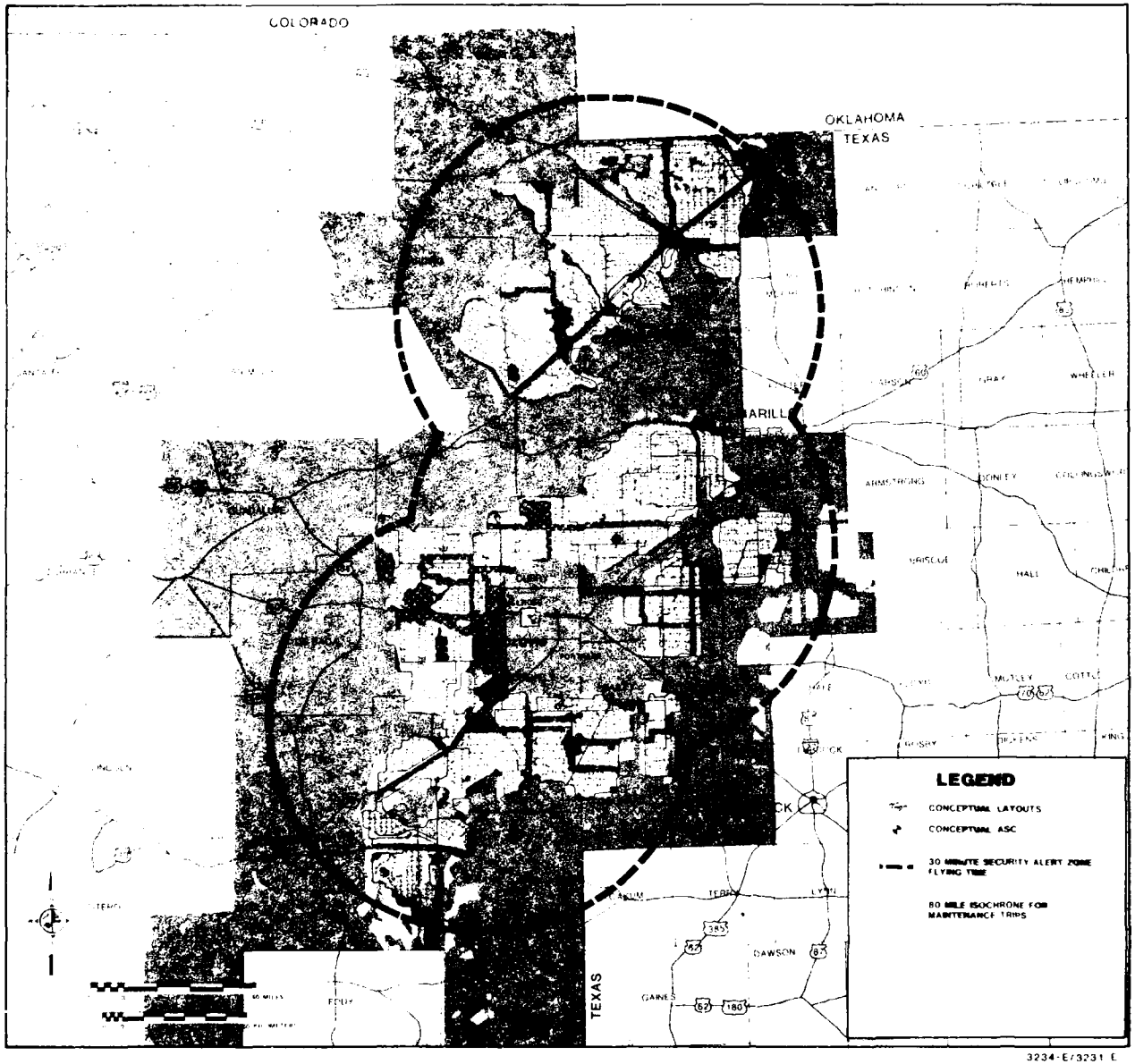
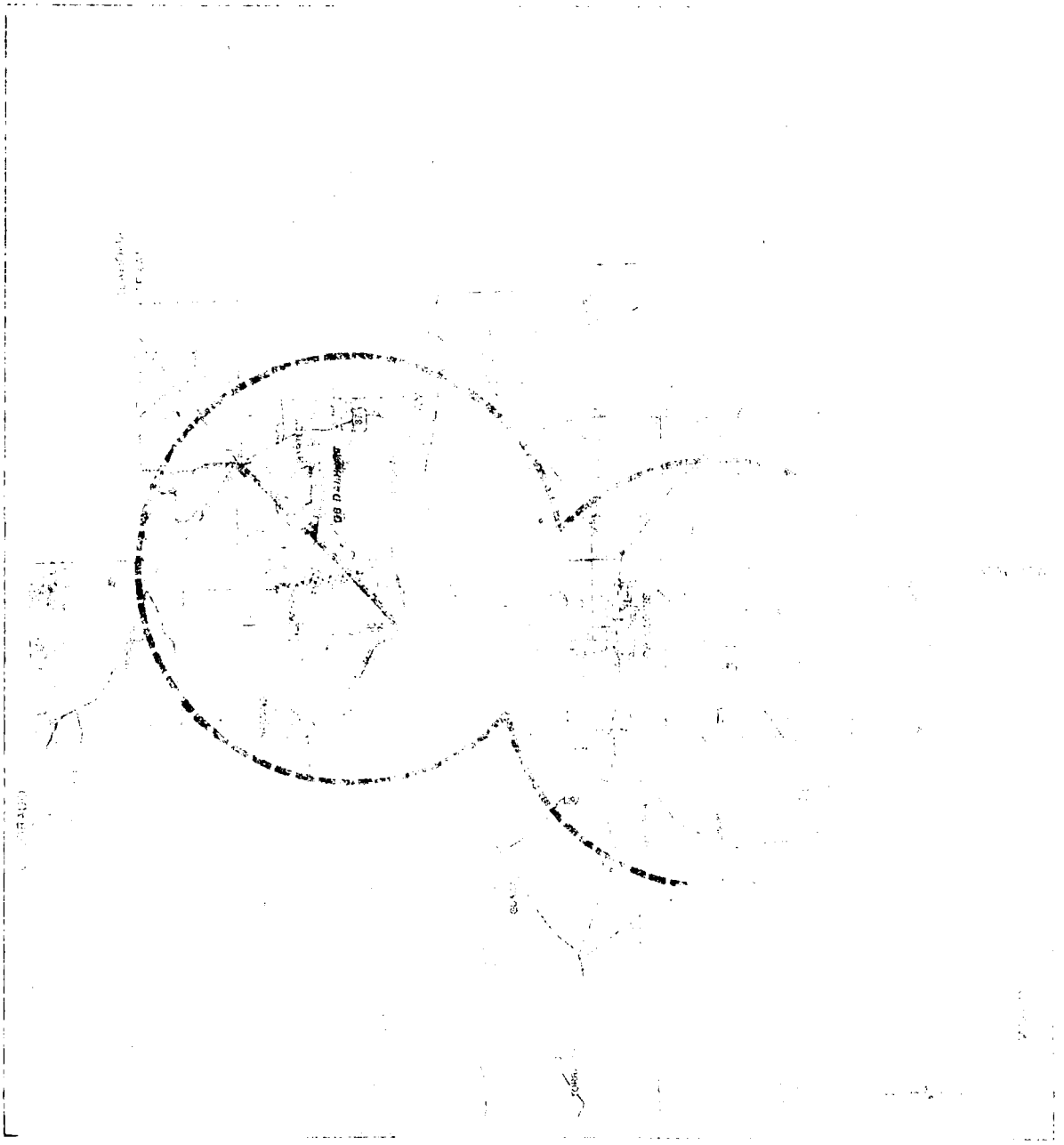


Figure 3.5-3. ASC flight time and driving time full system, Texas/New Mexico.



For maintenance force dispatch, a maximum driving time of 90 minutes oneway to the most remote facility for which an ASC is responsible is considered desirable, to avoid longer than usual workdays, and to minimize loss of operational readiness and efficiency. However, this requirement is not as rigid as that for security response. For planning, an on-the-road speed of 55 mi/hr has been assumed, corresponding to a distance of approximately 80 road mi from ASC to the edge of its area of responsibility. Any suitable road, existing or new, may be used. Although the assumed speed will not necessarily be feasible in inclement weather, it will be possible enough of the time to be a useful guide for ASC siting.

This requirement for response by road from the ASCs tends to favor sites that are on or adjacent to both public roads and the DTN, and at or near hub-like intersections providing access in all directions that lead toward clusters.

To provide secure overnight parking of the special transport vehicle, a bermed, double-fenced, lighted area will be provided adjacent to each ASC. This area will be observable from a security post within the ASC, manned as necessary with ASC security personnel, and close enough that additional personnel can reach it from the ASC rapidly if necessary for security backup. The ASC must consequently be on or near the DTN and accessible from it. It should also be sited in reasonably unbroken terrain to permit unobstructed observation of the secure parking area and its surroundings when the special transport vehicle is parked.

In addition to these locational considerations, the ASCs should be sited in areas that have geologic and topographic conditions similar to those suitable for protective shelters (although lesser depth to rock and water are tolerable) and should avoid culturally or economically important areas.

Although it is not strictly an operational requirement, it is also desirable for the ASC to be located within reasonable commuting distance (a few tens of miles) from a town large enough to provide both a potential source of employees, and housing for any additional workers that cannot be obtained from the local area.

Improved ASC siting requires positioning to service and protect the maximum number of clusters, as determined by air and ground response times. This factor favors sites that are well within the designated deployment area, centrally located within the groups of clusters that they service. It also makes potential Operating Base sites relatively inefficient as ASC sites, since OBs are located outside the deployment area to facilitate Strategic Arms Limitation monitoring.

The final section of ASC sites will require a high degree of judgment with respect to operational, biophysical, and socioeconomic factors, and will be a Tier 2 decision.

4.0 OPERATING BASE REQUIREMENTS

Two operating bases (OBs) will be required to operate the system, whether it is sited in a single contiguous area or split-based in two areas. Each base is estimated to require 4,000 to 8,000 acres, and will provide personnel and operational support for approximately one-half of the system.

The two OBs will provide functions unique to the M-X mission, including assembly and checkout of missile/special vehicle components and related equipment, maintenance, supply, training, and operational control of the M-X system. Additionally, each M-X operating base will provide personnel administration, warehouses, automotive maintenance, roads, buildings, and utilities maintenance. The base also provides medical and dental care, housing, shopping centers, and recreational facilities for military personnel and dependents, and elementary schools built and maintained by local school boards.

About 12,000 to 13,000 personnel are needed to operate and maintain the entire M-X system. The total population is estimated to be approximately 17,000 people (civilian personnel, and military personnel and their dependents) at the first base and 13,000 at the second base during normal working hours. Some military and all civilian personnel will live in communities near each of the bases.

Essentially all of the housing required to support Air Force families is planned for onbase construction. As the community near the operating base grows and can support housing requirements, some onbase housing construction could be cancelled. The EIS analyses assume that 80 percent of assigned military personnel will live onbase. See Figure 4-1 for conceptual layout.

Operating base planning goals are to: (1) maximize energy efficiency, (2) optimize land use, (3) minimize facility maintenance, (4) provide a high quality of life, and (5) minimize disruption of the natural environment.

Major facilities for the first operating base to be constructed are shown in Figure 4-2. The number and type of facilities to be constructed depends on whether full basing in a contiguous region or split basing is selected.

The second operating base to be built for contiguous basing alternatives has fewer facilities and a lower number of people than the first operating base. For split basing, the second operating base nearly duplicates the first, and the number of assigned personnel are approximately equal.

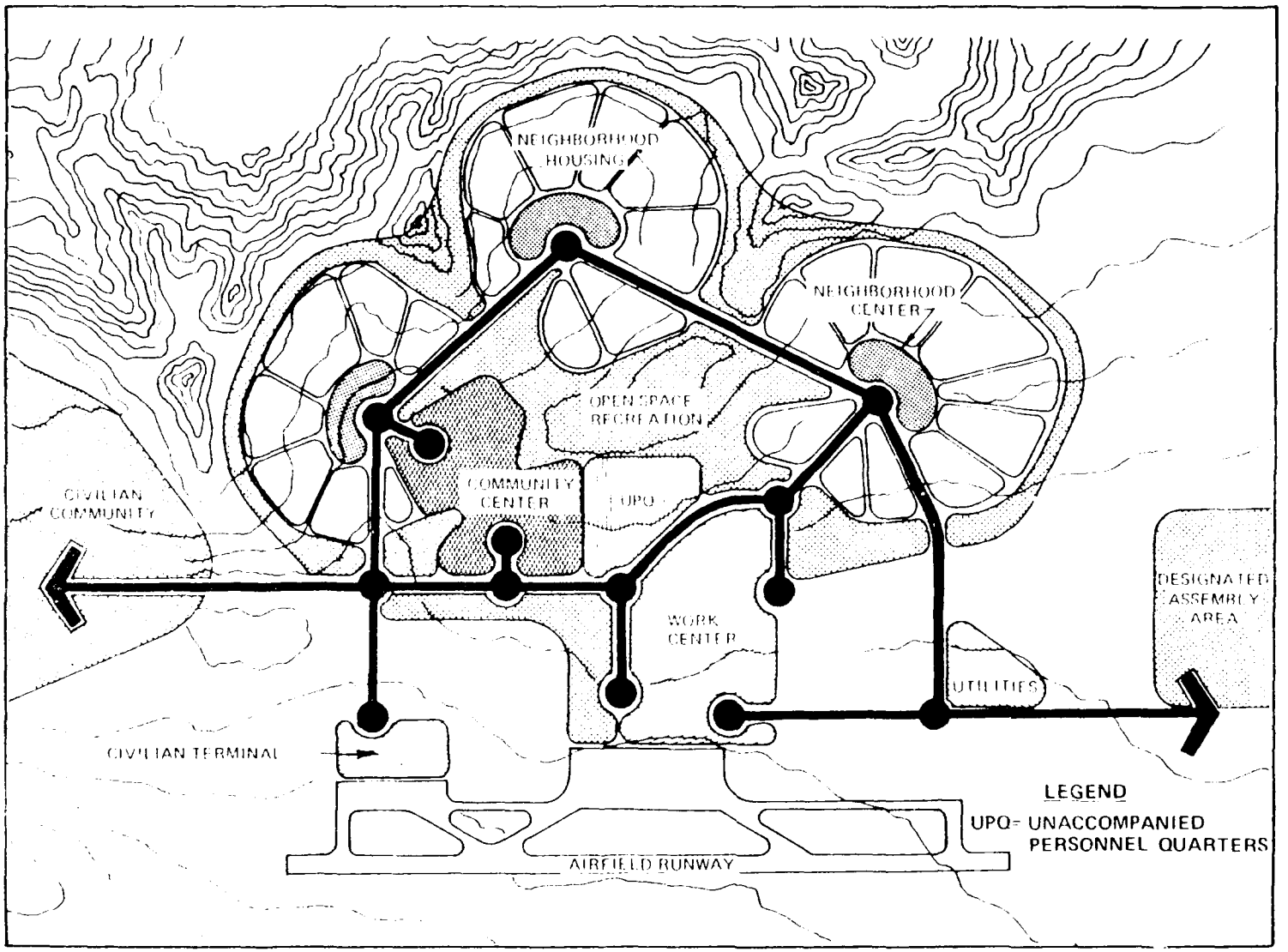


Figure 4-1. Conceptual base plan.

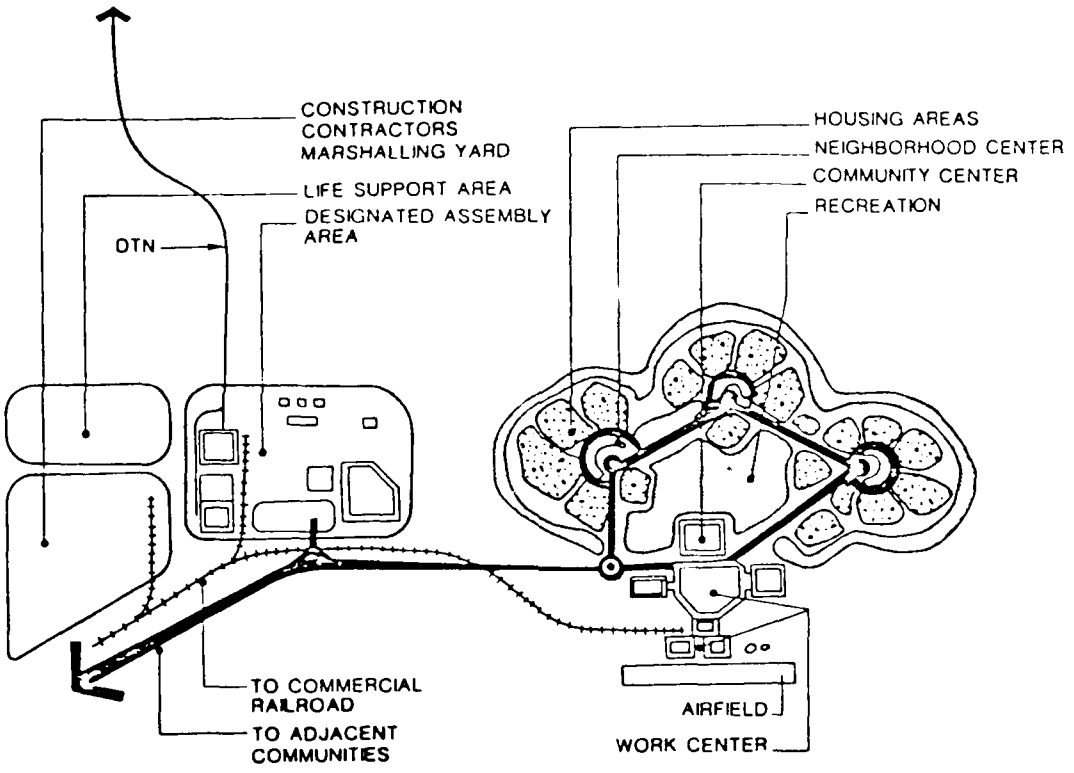


Figure 4-2. Conceptual layout of major facilities for first operating base.

A detailed description of the operating base facilities is included in the appendix. A description of the construction process is discussed in ETR 31.

4.1 OPERATING BASE SITING CRITERIA

As was done to determine the suitable deployment regions, a multi-stage screening process was used to identify suitable operating base (OB) locations. Since the OBs are an integral part of the M-X system, the OB location are linked to the location of the DDA. Therefore, the screening process begins by considering only vicinities in the general areas which have been identified as suitable for the DDA.

The first level of screening considered the following five general criteria (which are described in more detail in Sections 4.2.1 through 4.2.3);

- The OB locations must be in the same states as the deployment areas.
- The use of existing military bases must be considered.
- Sufficient suitable land area for the OB must be available.
- Considering the verification requirements of the Strategic Arms Limitation agreements, the Operating Base/DDA should be located outside the deployment area; therefore, the area around the perimeter of the suitable areas received the most intensive evaluation.
- The OB requires railroad and highway access.
- The OB must have convenient access to the DDA.

When the two suitable deployment regions were evaluated for candidate OB locations using these initial screening criteria, the following 27 vicinities were identified for further evaluation:

Nevada/Utah

- Battle Mountain (Buffalo Valley), NV
- Caliente/Panaca/Pioche, NV
- Coyote Spring (Clark Co.), NV
- Dry Lake (Clark Co.), NV
- Ely, NV

- Nellis Small Arms Range (Clark Co.), NV
- Nellis East (Clark Co.), NV
- Fallon NAS, NV
- Grass Valley (Winnemucca), NV
- Hawthorn/Naval Depot, NV
- Pabroc/Pahranagat Valleys, NV
- Pine Valley, NV
- Tonopah, NV
- Beryl, UT
- Delta, UT
- Dugway Proving Ground, UT
- Hill AFB (Ogden Depot), UT
- Milford, UT
- Tooele Army Depot, UT
- Wendover Bombing Range, UT

Texas/New Mexico

- Amarillo AFB, TX
- Dalhart, TX
- Reese AFB (Lubbock), TX
- Webb AFB (Big Spring), TX
- Cannon AFB (Clovis), NM
- Tucumcari, NM
- Walker AFB (Roswell), NM

Figure 4.1-1 illustrates the location of these candidate OB vicinities with respect to each candidate deployment region.

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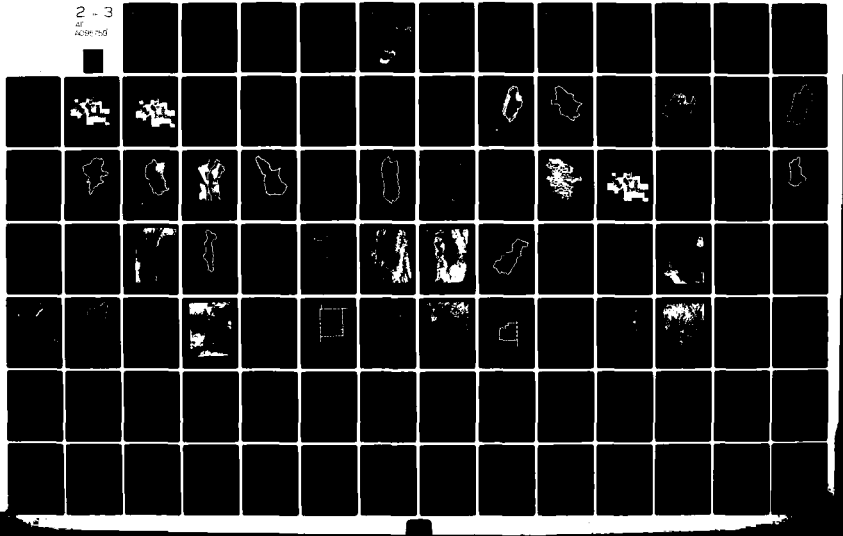


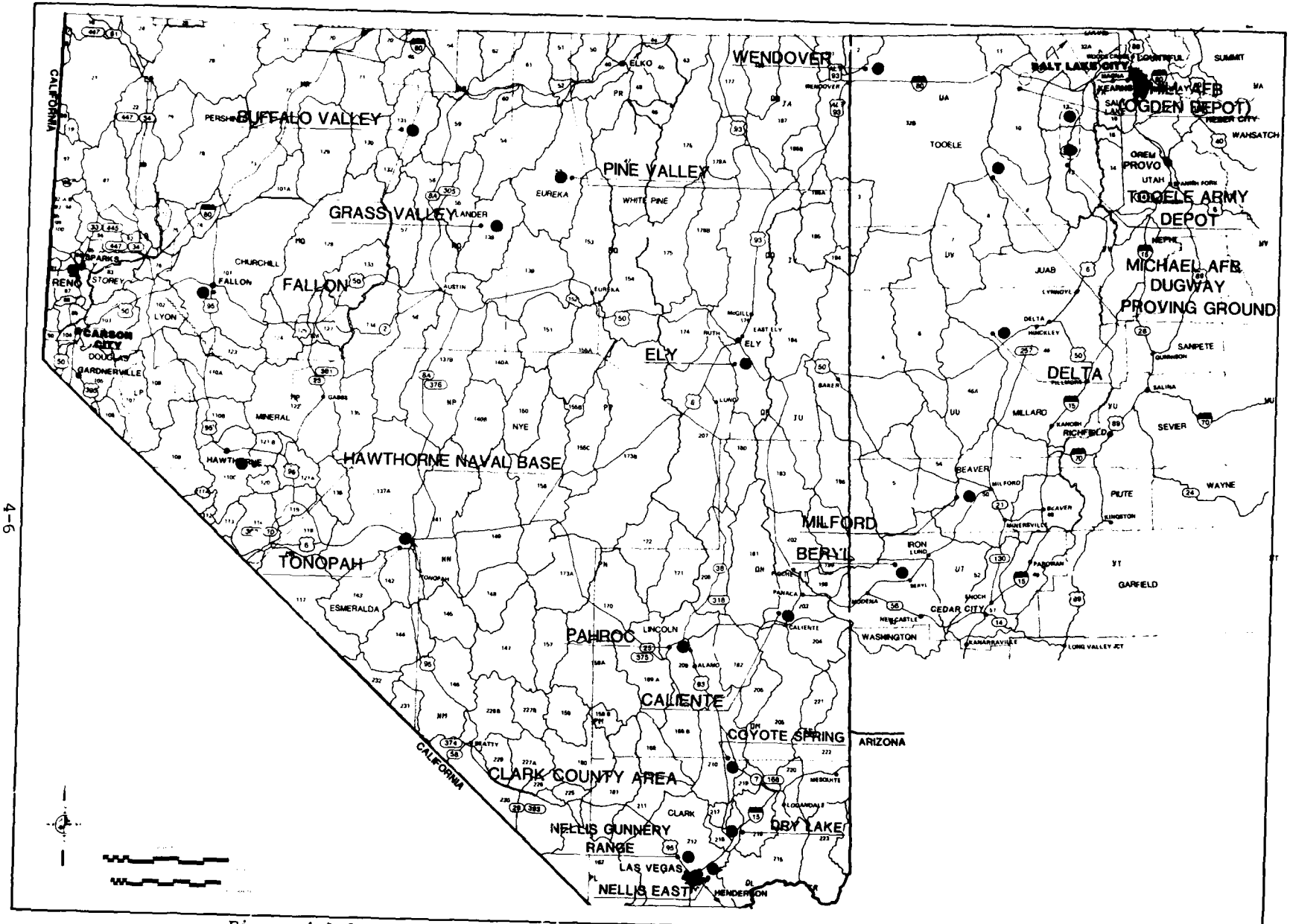


Figure 4.1-1. Preliminary candidate OB locations in Nevada and Utah.

A more in-depth set of criteria for potential OB location has evolved from Strategic Arms Limitation constraints, operational requirements, desirable site characteristics, quality of life considerations as well as cultural and environmental siting exclusions and exceptions. Many criteria were identified; however, some are more important when applied to the candidate OB locations under consideration, and are described below:

4.2 SITING REQUIREMENTS

STRATEGIC ARMS LIMITATION REQUIREMENTS (4.2.1)

To facilitate arms control monitoring, the OB/DAA should be located external to the deployment area by at least 90 minutes special transport vehicle (STV) travel time on the Designated Transportation Network (DTN) road. This timeframe is determined by the time it takes a satellite to orbit the earth. If the STV average speed is assumed to be 20 miles per hour the desired separation distance from the DAA to the deployment area is approximately 30 miles.

In selecting the DAA site avoid locations having potential external connectivity to the DTN. For example those sites having large buildings capable of surreptitious assembly of missiles in violation of arms control agreements.

The OB with the DAA is to be located in the site having the highest probability of cloud free line of sight to permit the highest-confidence of missile/launcher production verification by satellite.

OPERATIONAL REQUIREMENTS (4.2.2)

To ensure the success of the M-X operating base mission operational criteria were developed. These criteria were considered "Hard" or mandatory, for if they could not be met the success of the operating base mission would be compromised. Two such criteria are suitable areas for airfield and accessibility to designated deployment area (DDA).

Suitable Area for Airfield (4.2.2.1)

As can be expected, the airfield is a key element in siting the operating base. The airfield requires a large flat area with minimum physical obstructions. The airfield also requires, for construction purposes, that it be sited away from known faults, significant lakes, swamps, floodplains, perennial drainages, playas, and arroyos.

Other siting criteria for the airfield include:

- Nominal surface grade up to 5 percent
- Local surface grade not to exceed 10 percent, measured over a 1,000 ft length
- No more than two (2) 10-ft deep drainage crossings per 1,000 ft

After the intermediate screening, visibility and meteorological conditions were also considered and information was obtained for the candidate OB locations in Nevada/Utah. Candidate operating base locations within the Texas/New Mexico region did not receive this analysis since the region is relatively flat and Cannon AFB currently has an airfield in operation near Clovis, NM, as does Dalhart, TX.

Elevation above sea level and temperature above 90^{o} affect flight capabilities and payload capacity. Ely, Nevada is the only candidate site with an airfield above 5,100 ft which is the upper limit of optimum flight capabilities (see Figure 4.2-1).

An analysis of hydrologic subunits within the Nevada/Utah study region was undertaken to eliminate potential operating base locations. A template was made to scale representing a 12,000 ft runway with AFM 86-8 Airfield and Airspace Criteria Requirements. The analysis eliminated a number of hydrologic units from consideration (see Figure 4.2-2).

Accessibility to DDA (4.2.2.2)

Accessibility to the designated deployment area (DDA) from the designated assembly area (DAA) which is located with a first operating base is mandatory.

An analysis of transportation routes for the Nevada/Utah siting region was made. Hydrologic units with valley passes exceeding 7 percent into the proposed DDA area were eliminated from further consideration. Figure 4.2-3 illustrates the potential bases eliminated due to limited access and egress from the DDA to the potential first OB locations.

Other considerations for DDA accessibility were:

- Constructibility schedule
- Cost
- Length of DTN from potential first OB sites to DDA

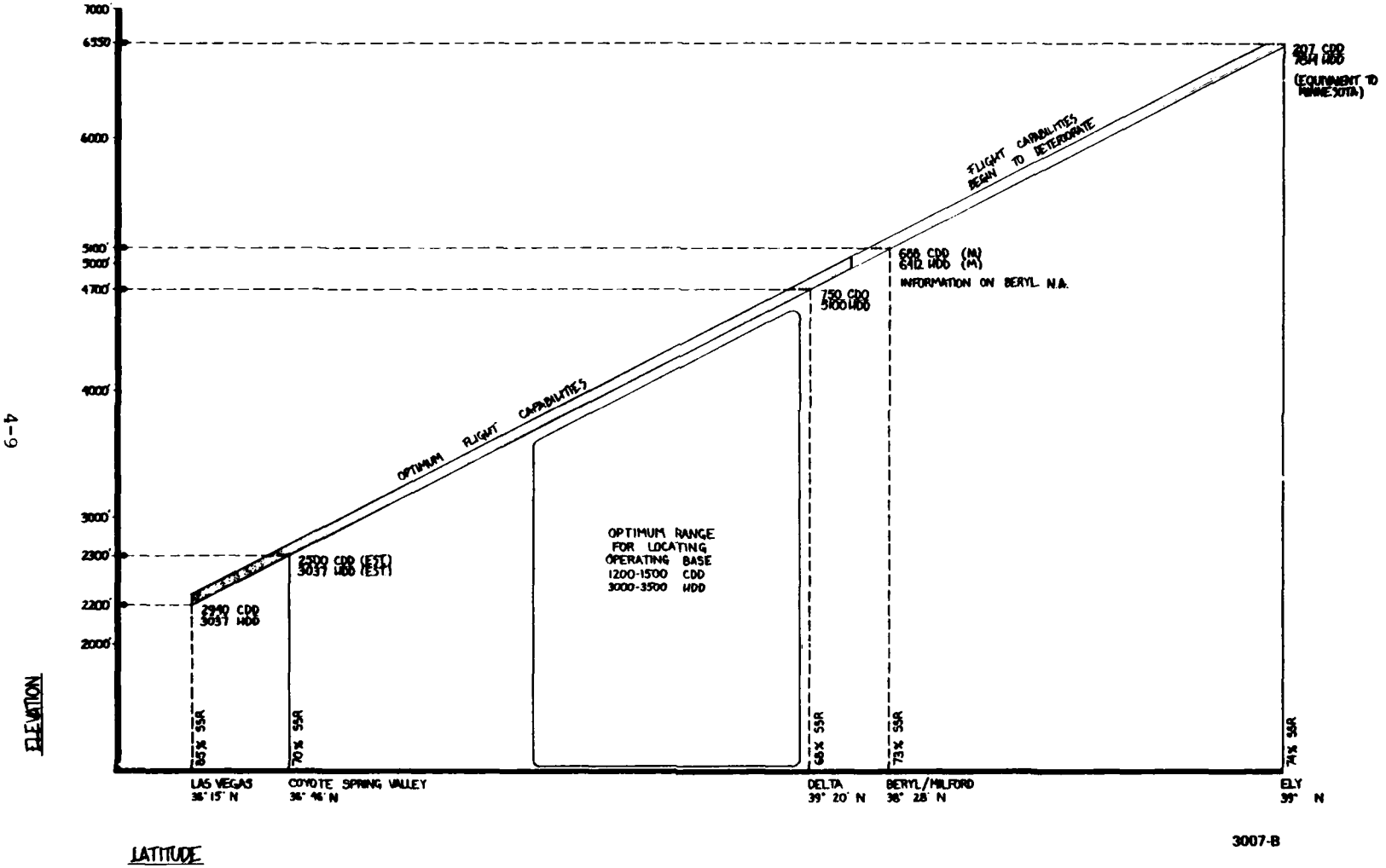


Figure 4.2-1. Elevation substitutes for latitude (a useful microclimate generalization graphic).

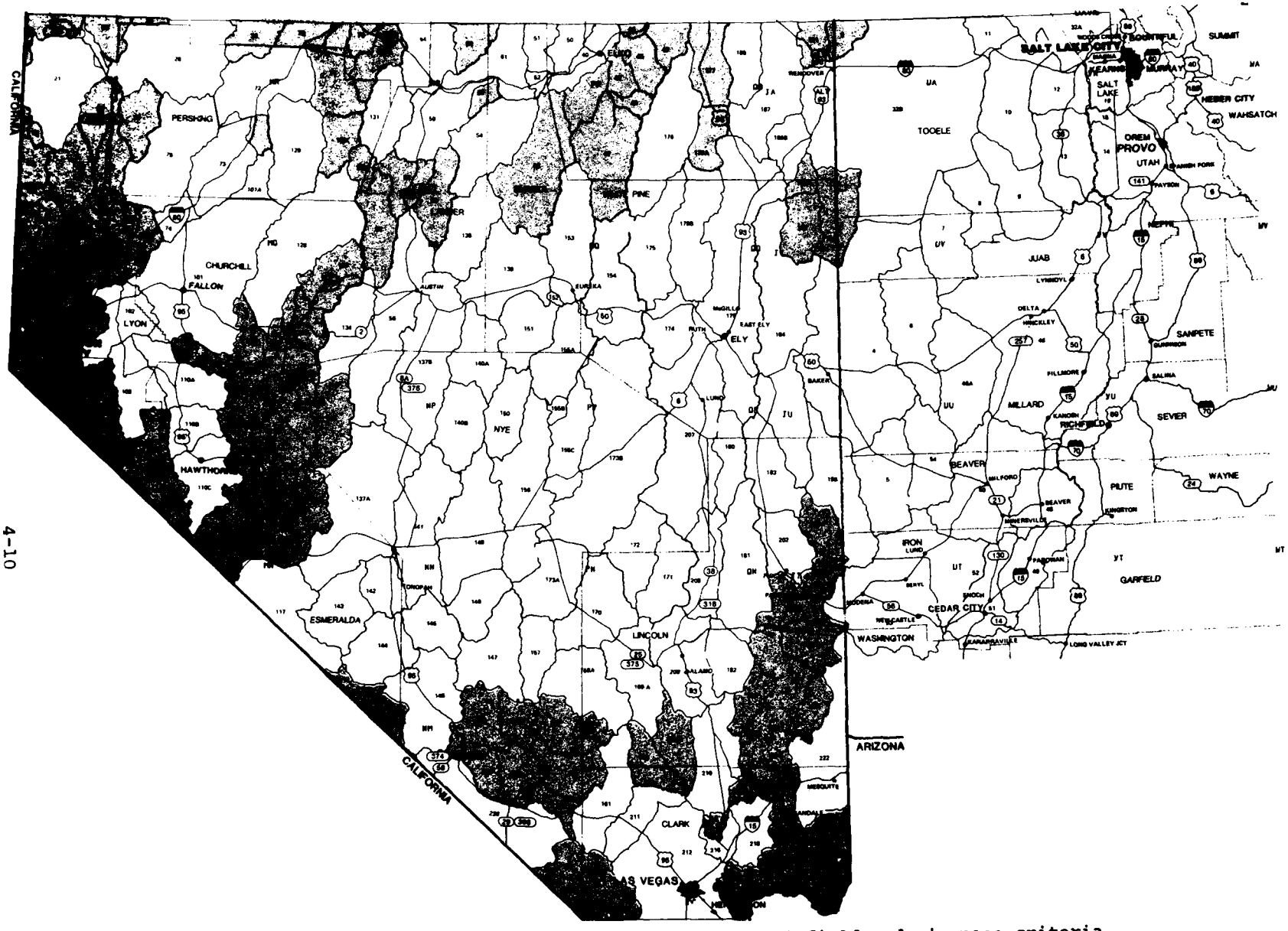


Figure 4.2-2. Hydrologic subunits eliminated due to airfield and airspace criteria.

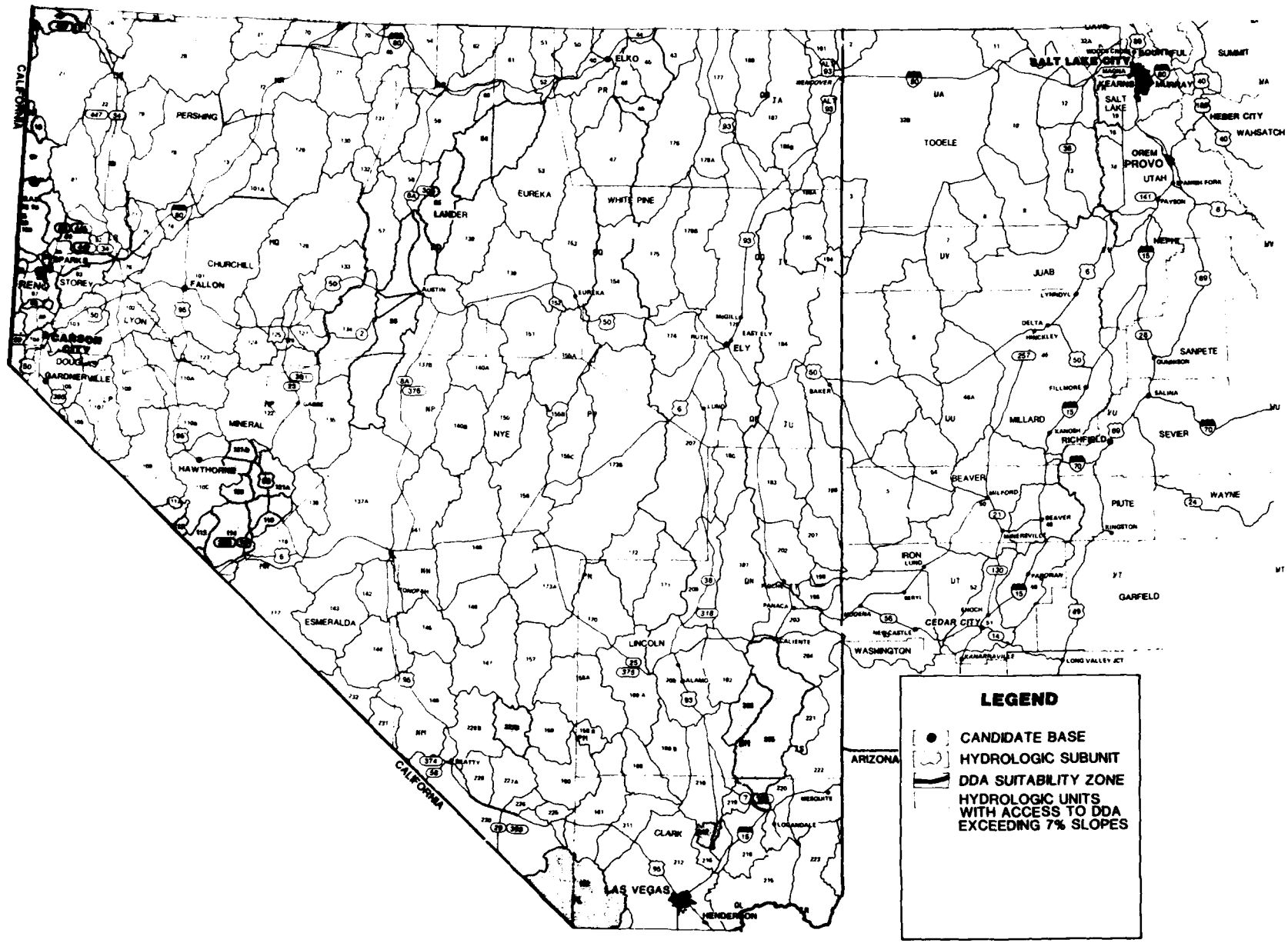


Figure 4.2-3. Hydrologic subunits with access and egress greater than 7 percent.

The Texas/New Mexico siting region is relatively flat within and immediately adjacent to the DDA. To the south of the proposed Dalhart site the terrain from the Punta Agua, Rita Blanca, and Canadian rivers becomes extremely erratic and unsuitable for locating an operating base in that area.

Rail Access (4.2.2.3)

Rail access to the first operating base is essential since missile components will be shipped by rail from Salt Lake City to the designated assembly area.

A main line with 133-136 lb/yd rail, should be close to any proposed first operating base, to reduce construction cost of a new spur line. Proximity to an existing main line is important. Proximity is important in that the nearer the first operating base is to a main line the cost of constructing a new spur line to the base will be reduced. Figure 4.2-4 illustrates the main line railroad systems in the Nevada/Utah siting region.

The requirements for a second operating base having a main line loading capacity is desirable but not mandatory. Should that requirement change, the rail line into Ely, would have to be upgraded to meet the 133-136 lb/yd loading capacity. This would mean upgrading approximately 70-75 mi of existing railroad.

An analysis was done of the Nevada/Utah siting region and Figure 4.2-4 illustrates the hydrological units that lie outside a 30 mi railroad corridor, and which were eliminated from further consideration.

Proximity to support community (4.2.2.4)

The M-X project is unique in that the proposed operating bases will be larger than all of the adjacent communities in the Nevada/Utah siting region. Not all of the base personnel will live on the operating base, therefore it is important that a community with the capacity to absorb 20 percent of the base personnel plus the civilian employees working at the operating base be within a reasonable commute distance. The Department of Defense (DOD) uses a one-hour commute time as a maximum for personnel not living at the operating base(s).

It became apparent in evaluating candidate OB locations that not only did they need to be located near roads and railroads but also needed to be near communities with infrastructures to supply goods and services and other community activities such as housing, schools, churches, theaters, restaurants, stores, and hospitals.

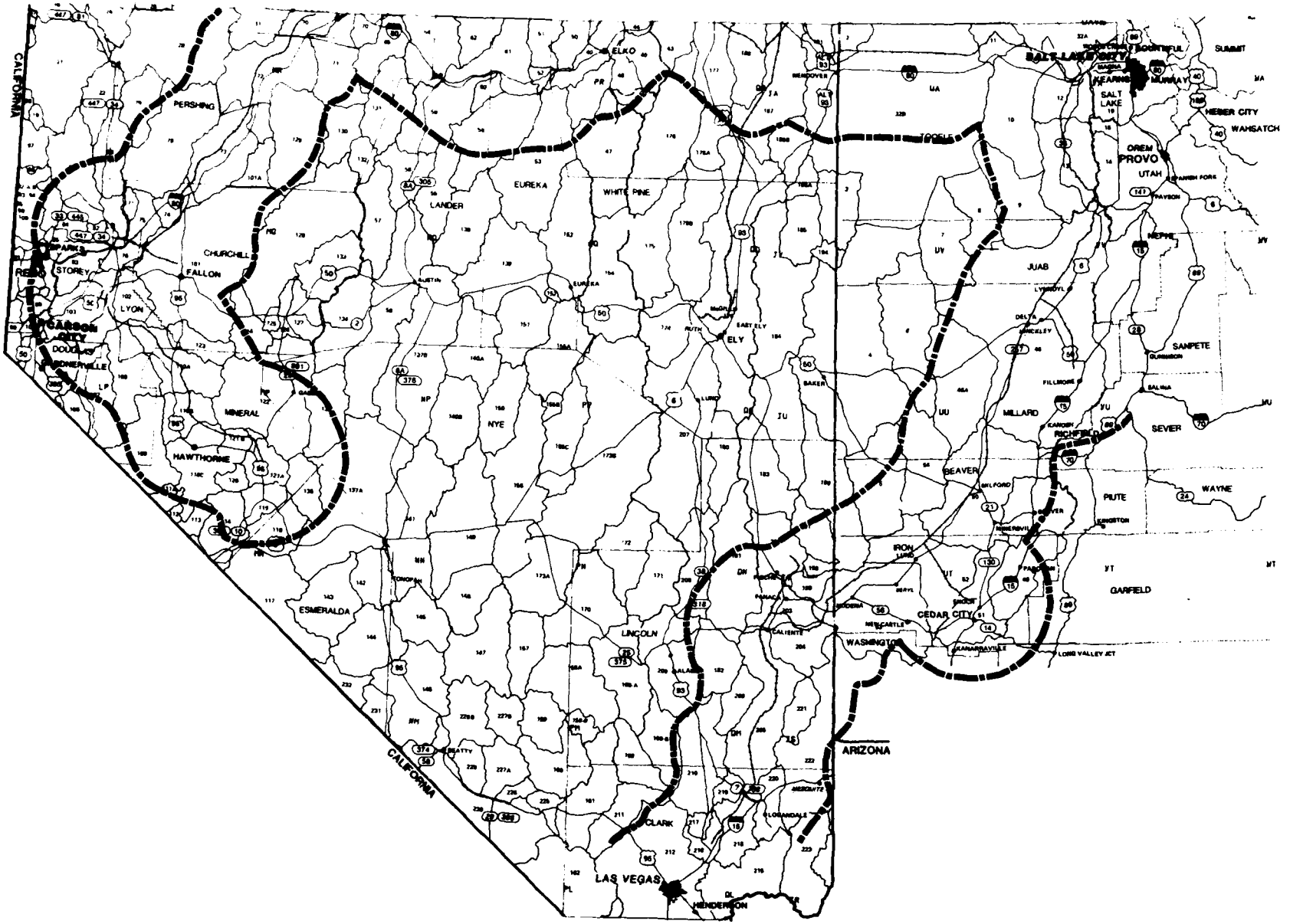


Figure 4.2-4. Main railroad line corridors in the Nevada/Utah study region.

Figure 4.2-5 illustrates the Nevada/Utah siting region one hour driving time isochrones from all communities of 1,200 or more. The purpose of the analysis was to eliminate hydrological units outside of the one-hour driving time. Figure 4.2-6 illustrates the hydrological units that are eliminated from further consideration by not fulfilling the one hour driving time. To minimize driving time and reduce consumption of gasoline the Air Force has had a policy to locate the operating bases in an area that would minimize commuting distances.

The OB locations in Texas/New Mexico region have community infrastructure within close proximity of each candidate location.

Proximity to Centroid (4.2.2.5)

The operating bases shall be located as near as possible to the centroid of the M-X force clusters to minimize the special transport vehicle missile canister transportation distance from the DDA to all clusters.

The centroid of the DDA was calculated and located on a system map for the Nevada/Utah siting region. Candidate operating base locations were evaluated and eliminated from further consideration based on travel time/distance of DTN to be constructed. The greater the distance from the centroid and IOC valleys the greater the cost and time required for construction, operation and maintenance activities.

Figures 4.2-7 through 4.2-10 illustrate the centroid of the proposed designated deployment areas with their respective candidate operating base locations. Figure 4.2-10 shows hydrologic units eliminated due to excessive travel time to centroid.

Tables 4.2-1 through 4.2-4 describe the mileage from the candidate operating base locations to the first cluster and to the centroid of each proposed designated deployment area.

Availability of Water (4.2.2.6)

Water is an essential resource necessary for the construction and operation of the OB. It is estimated that construction of an OB would require 2,400 to 2,800 acre-ft. Use of this quantity will be spread over approximately a five-year period. Most of the demands during construction are consumptive in nature, therefore, depletion will equal withdrawal.

For an OB where 80 percent of military personnel and dependents live onbase, water demand is estimated to be 4,000 acre-ft per year for a first OB and 2,900 acre-ft per year for a second OB. The demands at the OBs are basically domestic in nature and a large percentage (50 to 60 percent) of the withdrawal will be returned to a central facility in the form of sewage. After treatment, this water could be used to lessen potable water demands or could be used to recharge the local aquifer.

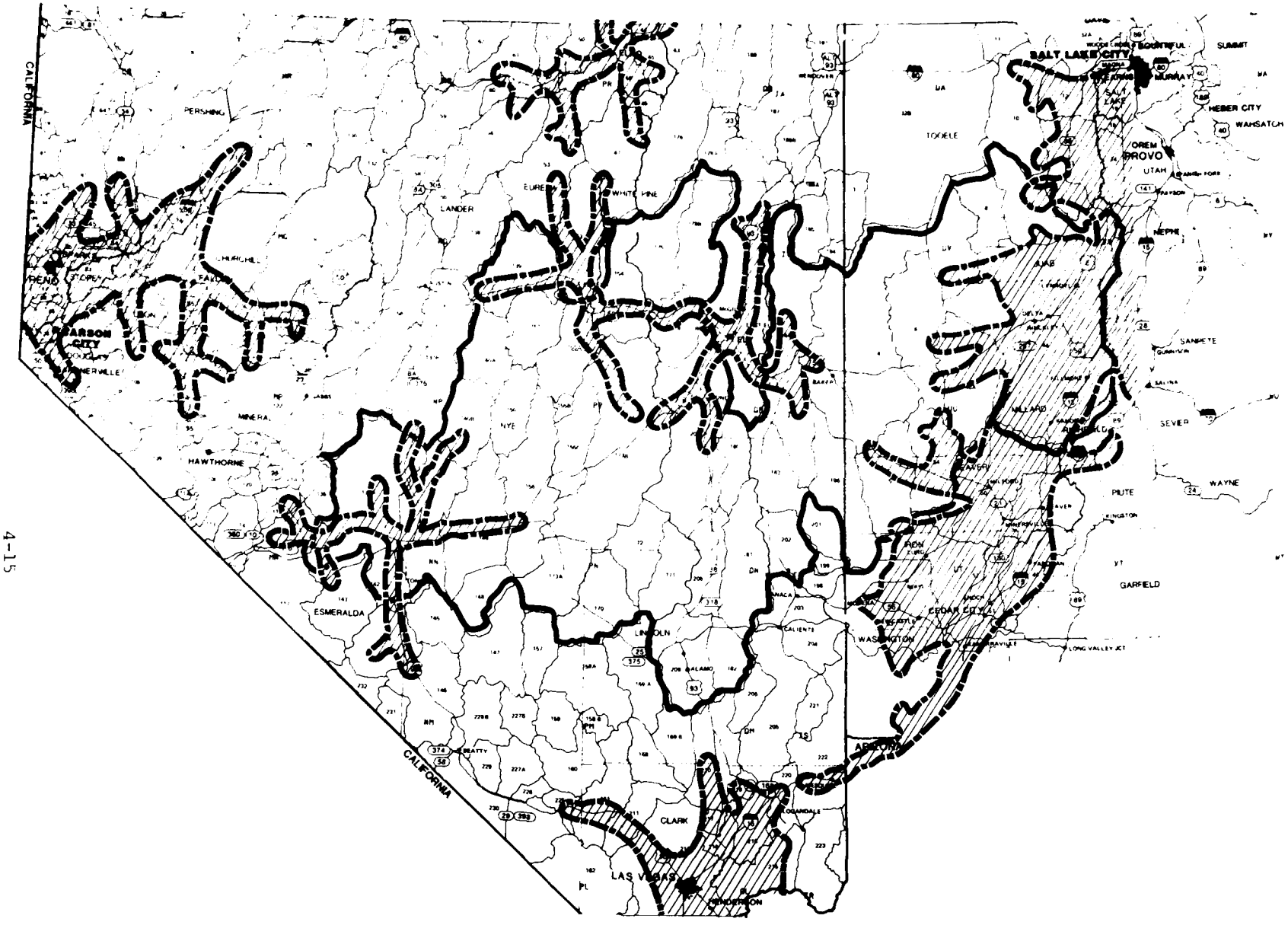


Figure 4.2-5. Isochrones from communites over 1,200 population.

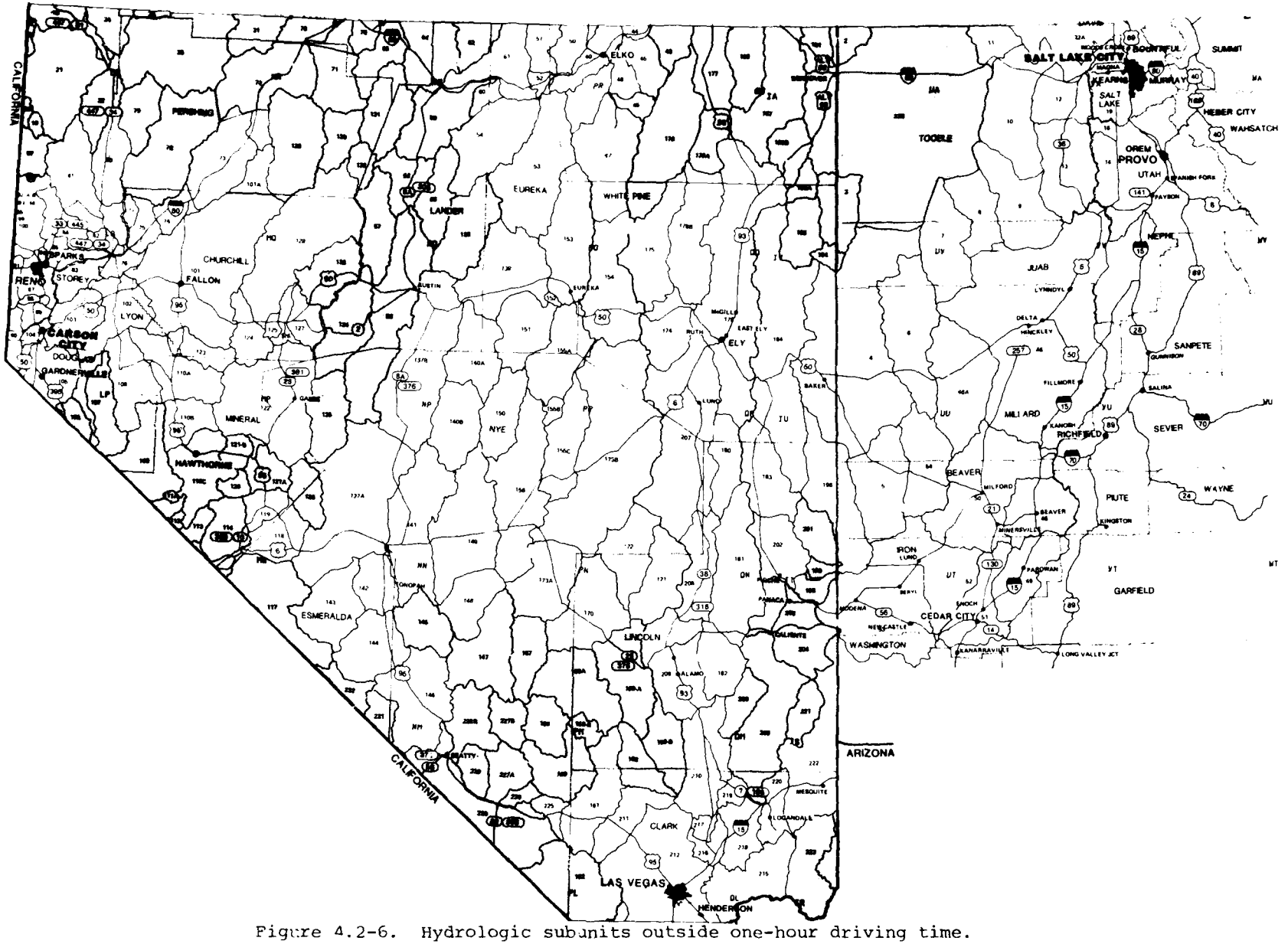


Figure 4.2-6. Hydrologic subunits outside one-hour driving time.

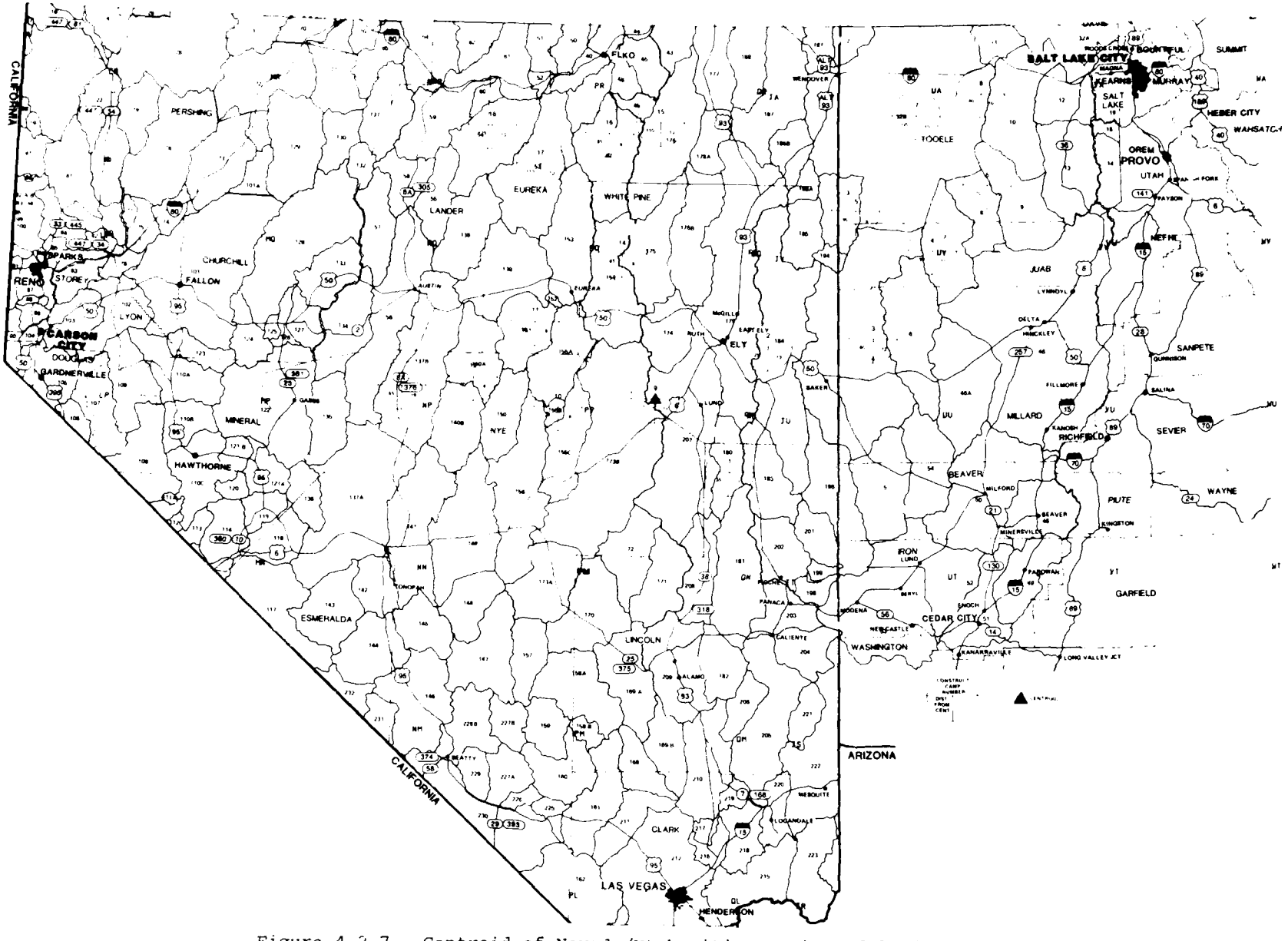


Figure 4.2-7. Centroid of Nevada/Utah siting region, full deployment.

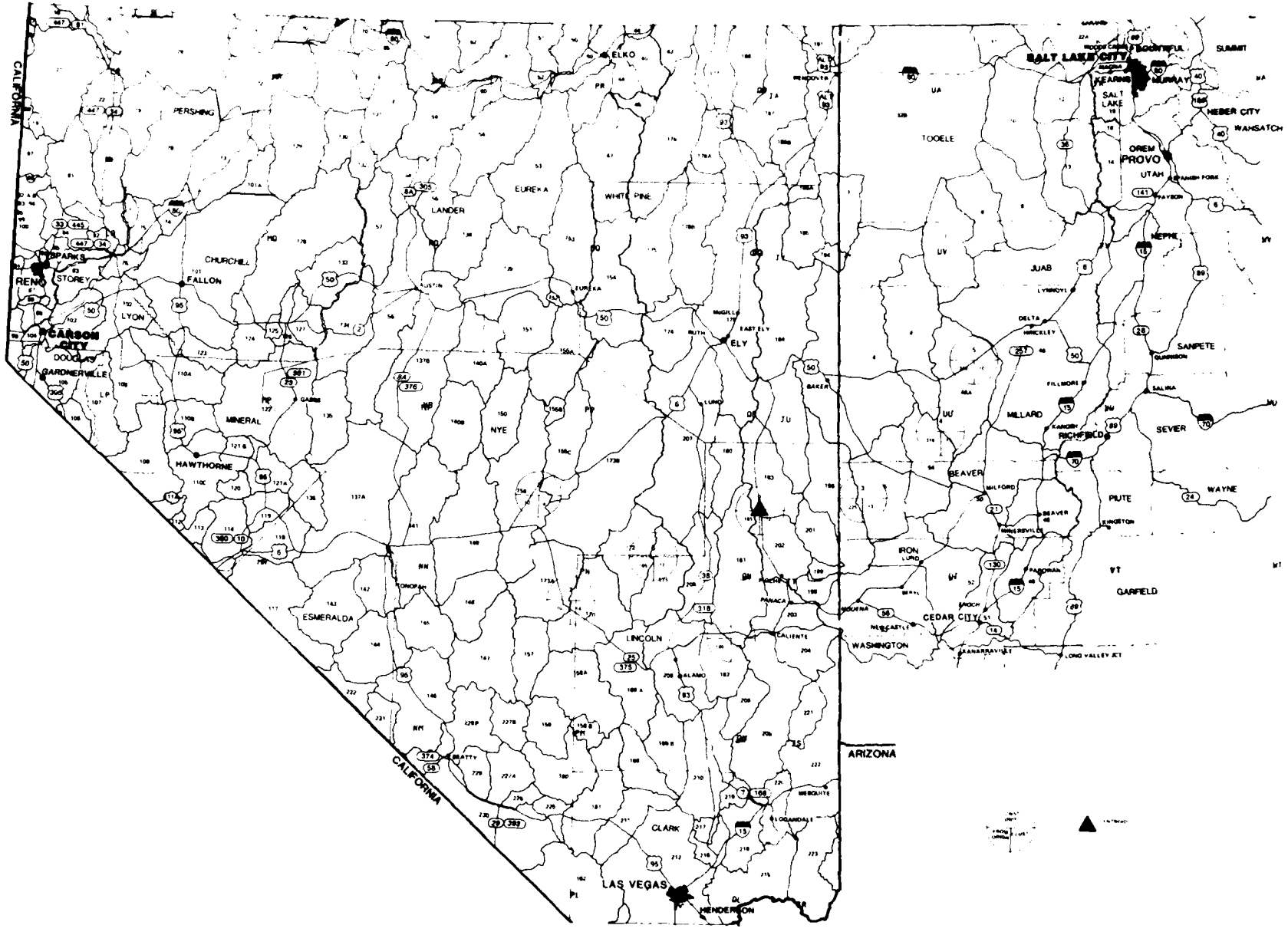


Figure 4.2-8. Centroid of Nevada/Utah siting region, split deployment.

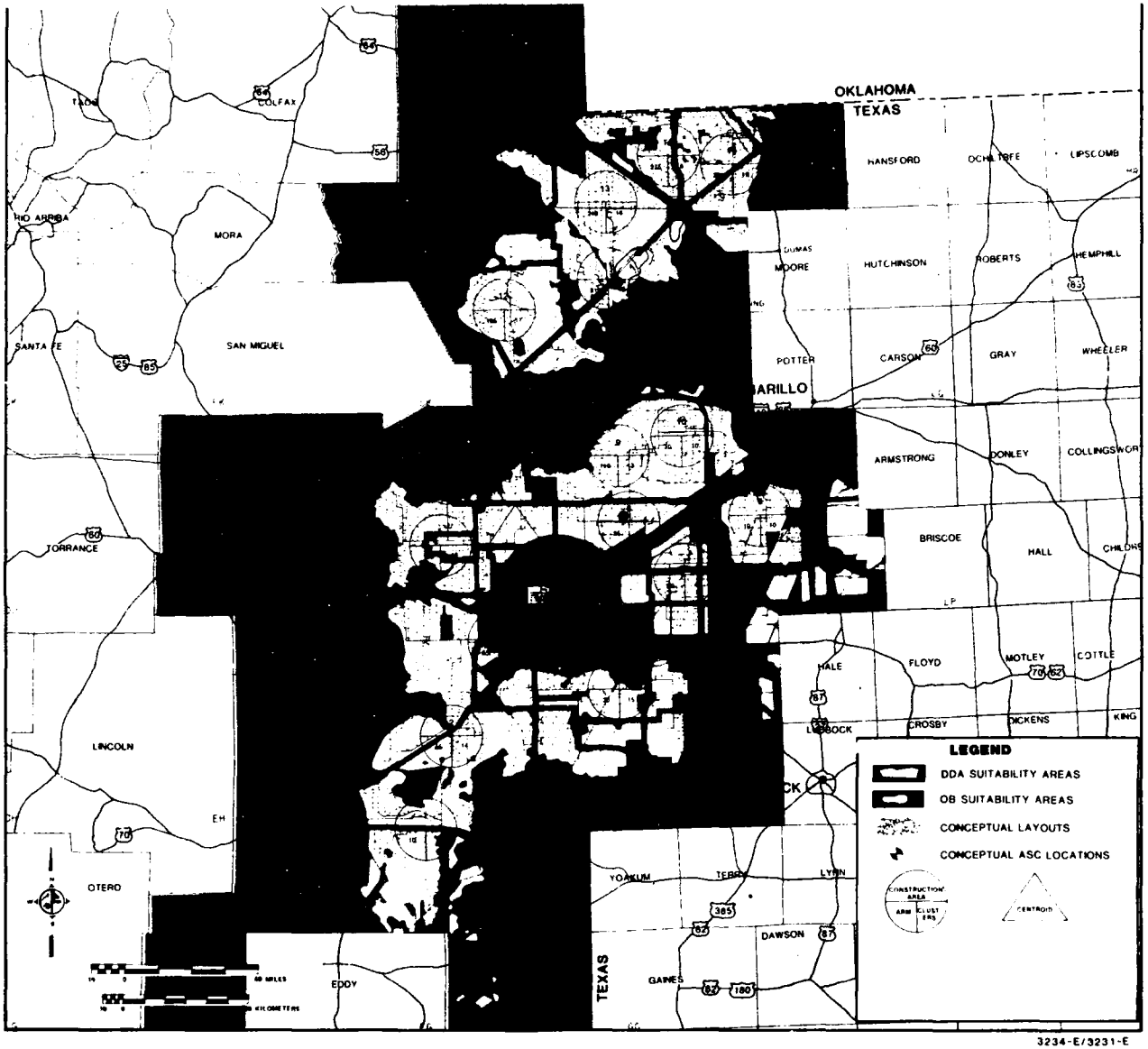


Figure 4.2-9. Centroid of full deployment, Texas/New Mexico siting region.

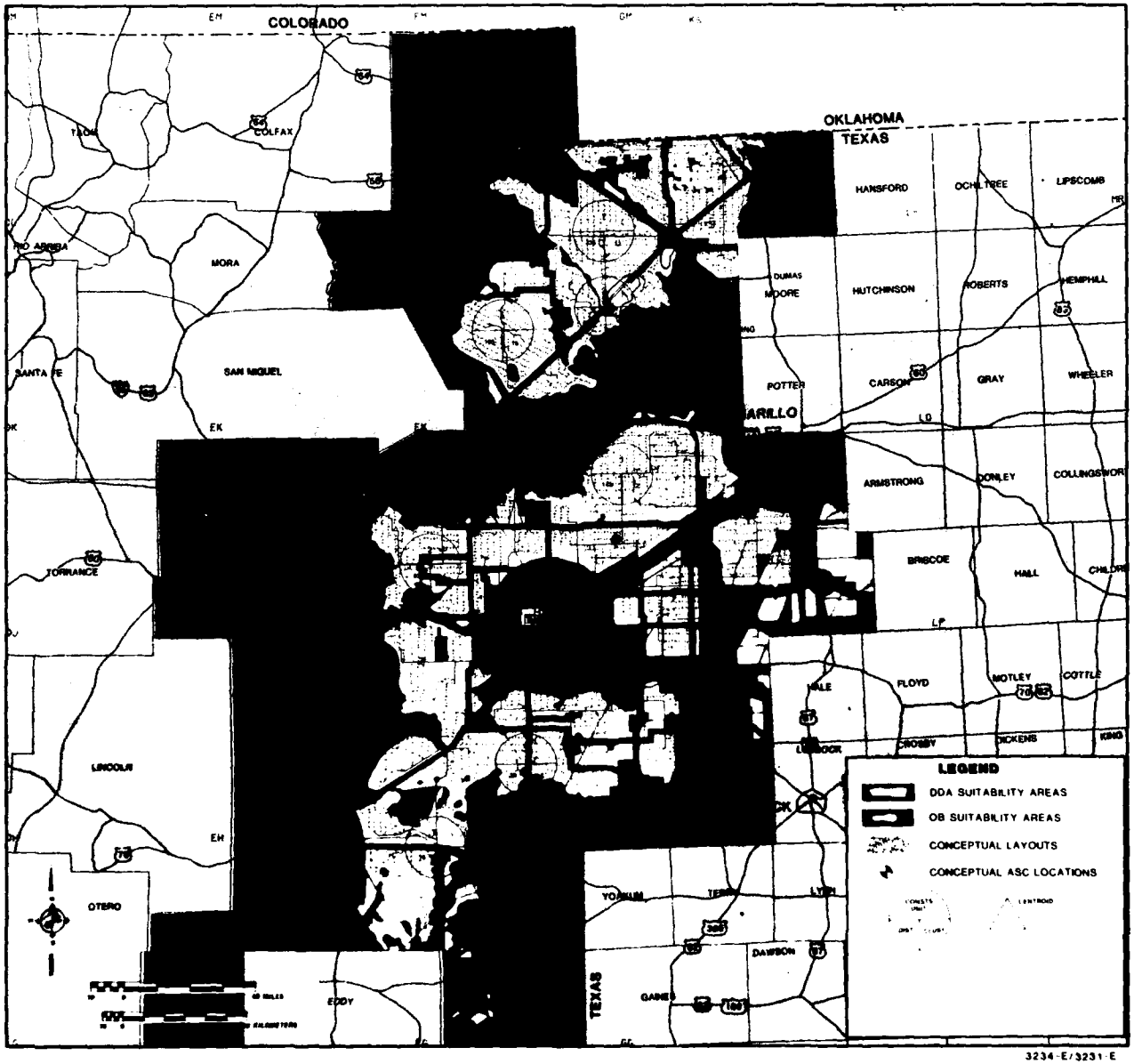


Figure 4.2-10. Centroid of split basing, Texas/New Mexico siting region.

Table 4.2-1. OB distance to centroid, full deployment, Nevada/Utah

CANDIDATE OPERATING BASE LOCATIONS	DISTANCE FROM OB TO FIRST CLUSTER	DISTANCE FROM OB TO CENTROID OF DDA	HOURLY TRAVEL TIME FROM OB TO FIRST CLUSTER AT 20 MPH	HOURLY TRAVEL TIME FROM OB TO CENTROID OF DDA AT 20 MPH
Hawthorne	110	210	5.5	10.5
Tonopah	8	108	.4	5.4
Pahroc	22	82	1.1	4.1
Caliente	19	79	.95	3.95
Coyote Spring	80	140	4.0	7.0
Dry Lake	110	270	5.5	13.5
Nellis Gunnery Range	130	190	6.5	9.5
Nellis AFB	121	181	6.05	9.05
Beryl	58	168	2.9	8.6
Milford	62	172	3.1	8.6
Delta	2	192	.1	13.5
Dugway (Michael AFB)	40	270	2.0	13.5
Tooele Area Depot S.	90	320	4.5	16.0
Tooele Depot N.	80	310	4.0	15.5
Wendover AFB	62	310	3.1	15.5
Ely	42	244	2.1	12.2
Pine Valley, NV	71	317	3.55	15.85
Buffalo Valley, NV	140	386	7.0	19.3
Grass Valley, NV	220	466	11.0	23.3
Fallon	151	397	7.55	19.85
Hill AFB	150	380	7.5	19.0

4225

Table 4.2-2. OB distance to centroid, Nevada/Utah split deployment.

CANDIDATE OPERATING BASES	DISTANCE FROM OB TO FIRST CLUSTER (MI)	DISTANCE FROM OB TO CENTROID OF DAA (MI)	TRAVEL 20 mph TIME (HR)	TRAVEL 20 mph TIME (HR)
N. Grass Valley	308	375	15.4	18.75
E. Buffalo Valley	240	315	12.0	15.75
N. Pine Valley	234/220	220/222	11.7/11.0	11.0/11.1
N.W. Great Salt Lake	212	208	10.60	10.40
S. Great Salt Lake	128	242	6.40	12.10
S. Tooele Valley	125	280	6.25	14.00
N. Sevier Lake Valley	2	148	.10	7.40
Tonopah	50	178	2.50	8.90
N. Pahranagat	28	88	1.40	4.40
Caliente	22	52	1.10	2.60
Beryl	86	85	4.30	4.25
Milford	30	130	1.50	6.50
Coyote Spring	46	124	2.30	6.20
Dry Lake	77	155	3.85	7.75
N. Nellis AFB	99	177	4.95	8.85
N.E. Nellis AFB	95	173	4.75	8.65
Hill AFB	150	380	7.55	19.0

4226

Table 4.2-3. OB distances from centroid, Texas/New Mexico full basing.

CANDIDATE OPERATING BASE	DISTANCE FROM OB TO FIRST CLUSTER	DISTANCE FROM OB TO CENTROID OF DDA	HOURS TRAVEL TIME (20 mph.)	HOURS TRAVEL TIME (20 mph.)
Tucumcari	37	49	1.85	2.45
Roswell	35	136	1.75	6.80
Dalhart	6	98	0.30	9.40
Amarillo	48	130	2.40	6.50
Lubbock	68	142	3.40	7.10
Clovis	28	32	1.40	1.60
(Big Spring) Webb AFB	260	332	13.0	16.6

4227

Table 4.2-4. OB distances from centroid, Texas/New Mexico split basing.

CANDIDATE OPERATING BASE	DISTANCE FROM OB TO FIRST CLUSTER	DISTANCE FROM OB TO CENTROID OF DDA	HOURS TRAVEL TIME (20 mph.)	HOURS TRAVEL TIME (20 mph.)
Tucumcari	37	36	1.85	1.80
Roswell	35	148	1.75	7.40
Dalhart	12	85	0.60	4.25
Amarillo	64	120	3.20	6.00
Lubbock	68	152	3.40	7.60
Clovis	25	38	1.25	1.90
(Big Spring) Webb AFB	260	332	13.HR	16.6

4228

In addition to the water necessary to construct and operate the OB, water demands at nearby communities will increase due to the proximity of the base. The quantity of the additional demands will vary from proposed site to proposed site but generally an additional 2,000 acre-ft per year will be required for support community needs.

The proposed OB locations all lie within areas where available water supplies are limited. An OB in these areas will increase the competition for the limited resource. Increased development could lead to the diversion of water which might impact a current use.

4.3 DESIRABLE SITING CHARACTERISTICS

This section will outline those siting characteristics that would be desirable to achieve if possible.

Desirable site conditions would be:

- Suitable surface grade for DDA/OBTS/Training and Airfield
- South to southeast-facing slope to allow maximum use of solar design
- Use of slope for gravity flow systems
- Base community on slope to take advantage of the microclimate (i.e., diurnal swings)
- Mountains north and or west of base area to deflect winter winds
- Moderate climate to provide pleasant living environment and minimum restrictions for flying and M-X system operation
- Take advantage of scenic views
- Proximity to established economic base
- Access to public recreation areas

4.4 APPLICATION OF CRITERIA

The 27 community vicinities identified as candidates for an OB location were screened using the detailed set of siting criteria described above. As with the DDA, hydrologic subunits was used for purposes of analysis and locational reference in the Nevada/Utah region, and county units in Texas/New Mexico.

The previously described method of graphic analysis was used to facilitate the screening process. Each candidate community vicinity was located on a base map and a series of graphic overlays applied, each representing a siting criteria.

If the candidate vicinity did not satisfy a specific criteria, or number of criteria, it was eliminated from further consideration and identified as unsuitable on the base map. Each candidate vicinity is located within one or more hydrologic subunits in Nevada/Utah or within a county in Texas/New Mexico. When a candidate vicinity was eliminated through the graphic siting criteria analysis, the hydrologic units or county (within which it is located) in the applicable deployment region was identified on the base map as being unsuitable. For example, railroad access to the OB location is a siting criteria and a 30 mi corridor along each side of the existing railroad network was illustrated and applied to the base map. If a candidate community vicinity was not within, or reasonably near, that corridor it did not comply with the siting criteria and was eliminated from further consideration. Some candidate vicinities failed to satisfy numerous criteria and are described in the following paragraphs.

Figure 4.1-1 illustrated this graphic analysis for the Nevada/Utah region and Figure 4.1-2 for Texas/New Mexico. As can be seen, the analysis identified 20 community vicinities which failed to satisfy one or more of the siting criteria and which were eliminated from further consideration. The primary reasons for the elimination of the 20 candidate vicinities from further consideration as OB locations are presented below.

NEVADA/UTAH (4.4.1)

- Battle Mountain (Buffalo Valley), Nevada

  An OB located in this vicinity would be about 140 mi from the nearest DDA cluster and about 380 mi from the DDA centroid. This distance would result in excessive security, operations/maintenance response times, increased fuel costs, and vehicle operation/maintenance costs.

  The access from the valley to the DDA would be through passes which exceed 7 percent grade and therefore conflict with DTN grade criteria (see Figure 4.4.1-1).

- Caliente/Panaca/Pioche, Nevada

  There is insufficient area to locate an airfield which can satisfy airfield clearance criteria. Even with the potential of obtaining criteria waivers for some obstacles (as in other candidate OB locations), this location would seriously violate airfield clearance criteria (Figure 4.4.1-2).

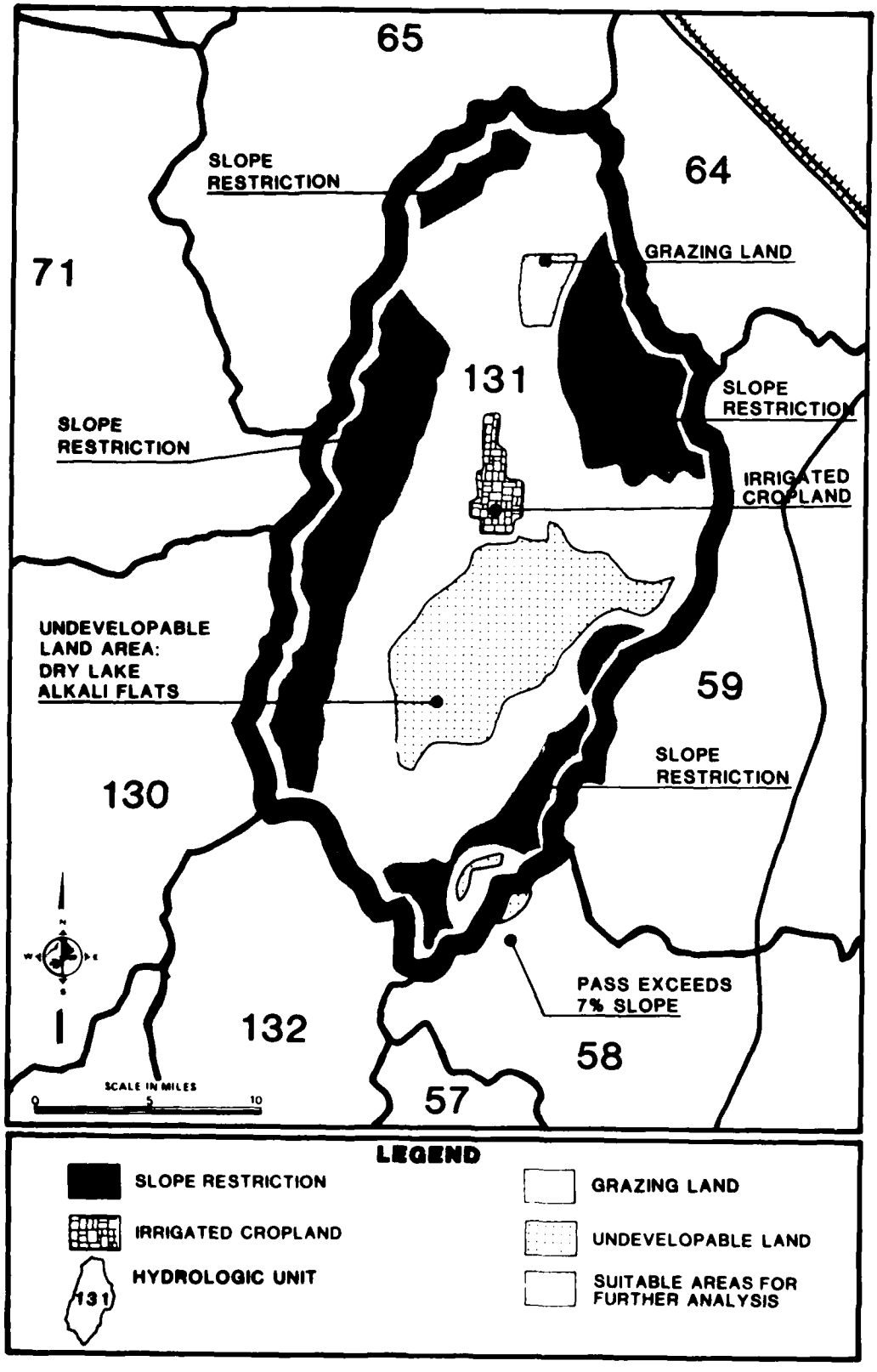


Figure 4.4.1-1. Preliminary candidate OB location, Battle Mountain, Nevada.

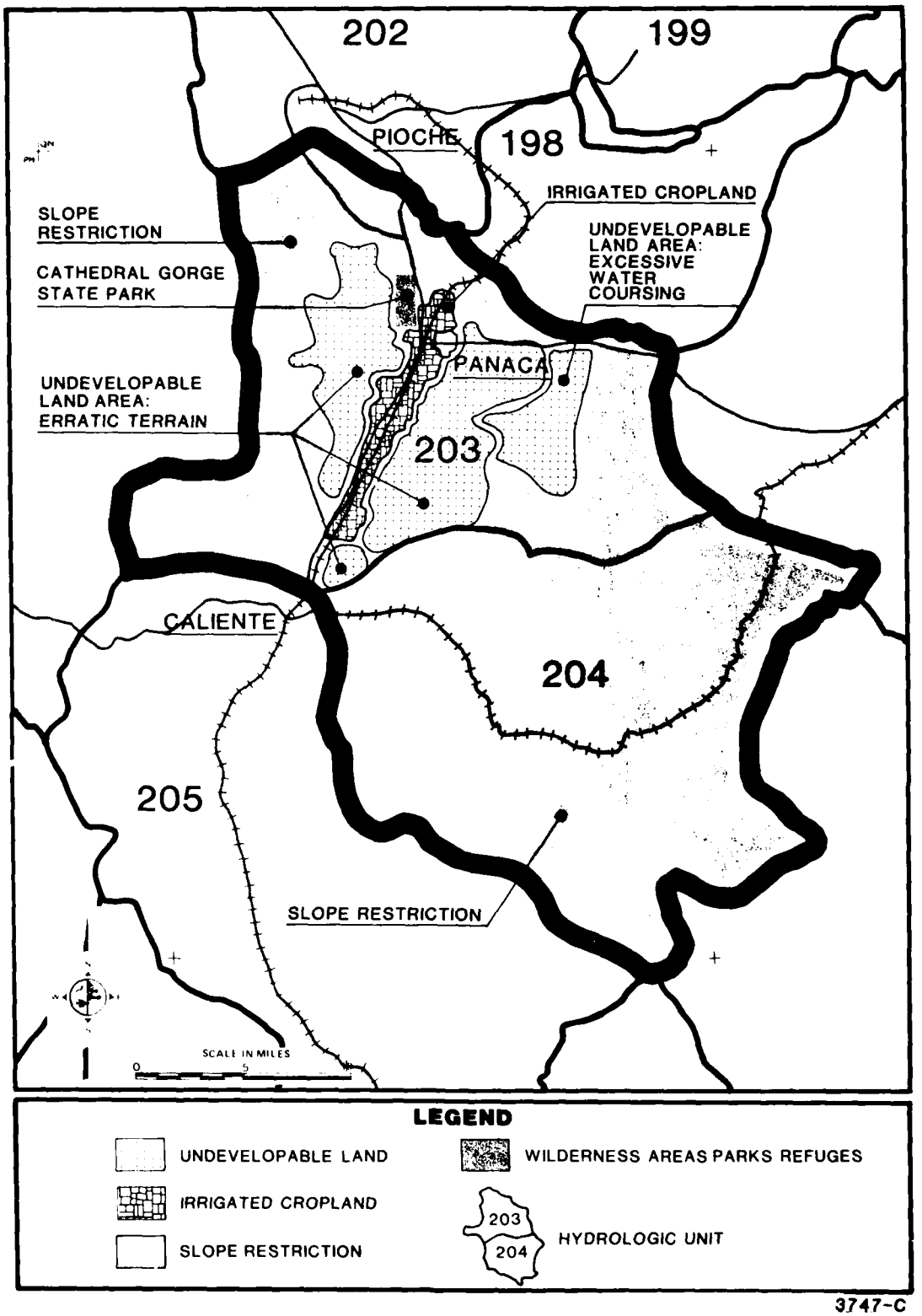


Figure 4.4.1-2. Preliminary candidate OB location, Caliente/Panaca/Pioche, Nevada.

- Dry Lake, Nevada

  This area has been selected as the potential site of the proposed Harry Allen Power Plant. Location of this project would reduce the suitable area for an OB to the point of insufficiency. In addition, plant location and operation could conflict with airfield/aircraft operations (see Figure 4.4.1-3).

- Nellis Small Arms Range, Nevada

  This area was originally an Army artillery range and although unexploded ordnance has been cleared from the surface, it is presumed that such ordnance is still buried at depths of up to 30 ft. The area is also occasionally used as an aircraft unexploded bomb jettison area.

  The present small arms range does not meet Tactical Air Command requirements and an additional 5,000 acre expansion is proposed. Insufficient suitable area remains for an OB location (see Figure 4.4.1-3).

- Nellis East, Nevada

  Existing facilities are fully utilized and excess land is primarily old land fill (dump) area which totals less than 1,000 acres. Expansion into adjacent areas would require elimination of an existing weapons storage area and disruption/relocation of an existing road network (see Figure 4.4.1-3).

- Fallon Naval Air Station, Nevada

  Fallon NAS is located about 150 mi from the nearest DDA cluster and about 400 mi from the DDA centroid. This excessive distance would increase security and operations/maintenance and cost.

  The access to the DDA would be through mountain passes which exceed 7 percent grade and therefore conflict with DTN grade criteria. Additionally the area has a high water table which conflicts with geotechnical criteria (see Figure 4.4.1-4).

- Grass Valley, Nevada

  Grass Valley is located about 220 mi from the nearest DDA cluster and about 460 mi from the DDA centroid. In addition to this excessive distance, DTN access to and from the valley would exceed the maximum 7 percent grade criteria (see Figure 4.4.1-5).

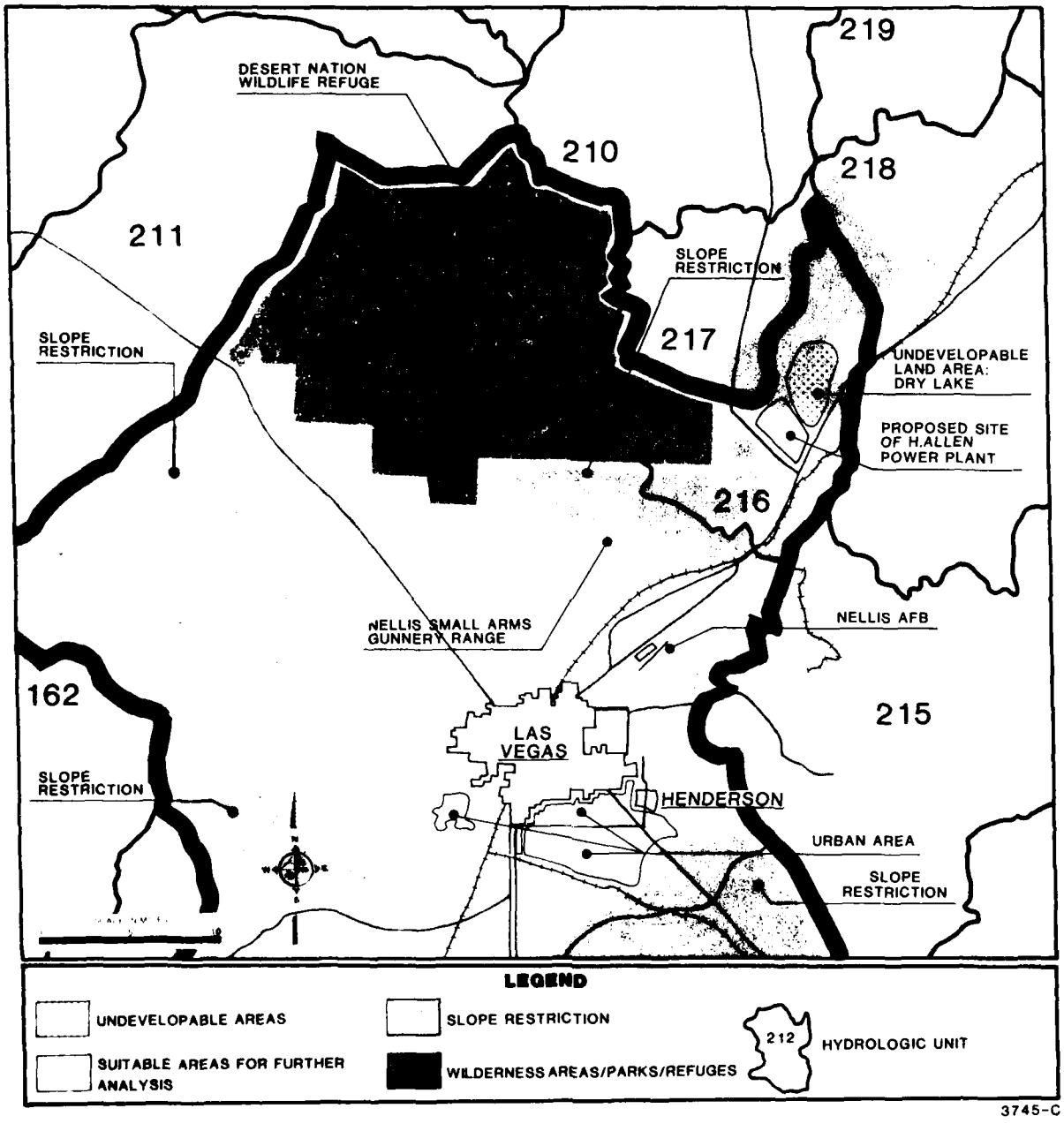


Figure 4.4.1-3. Preliminary candidate OB location, Dry Lake, Nellis East, Nellis Small Arms Range, Nevada.

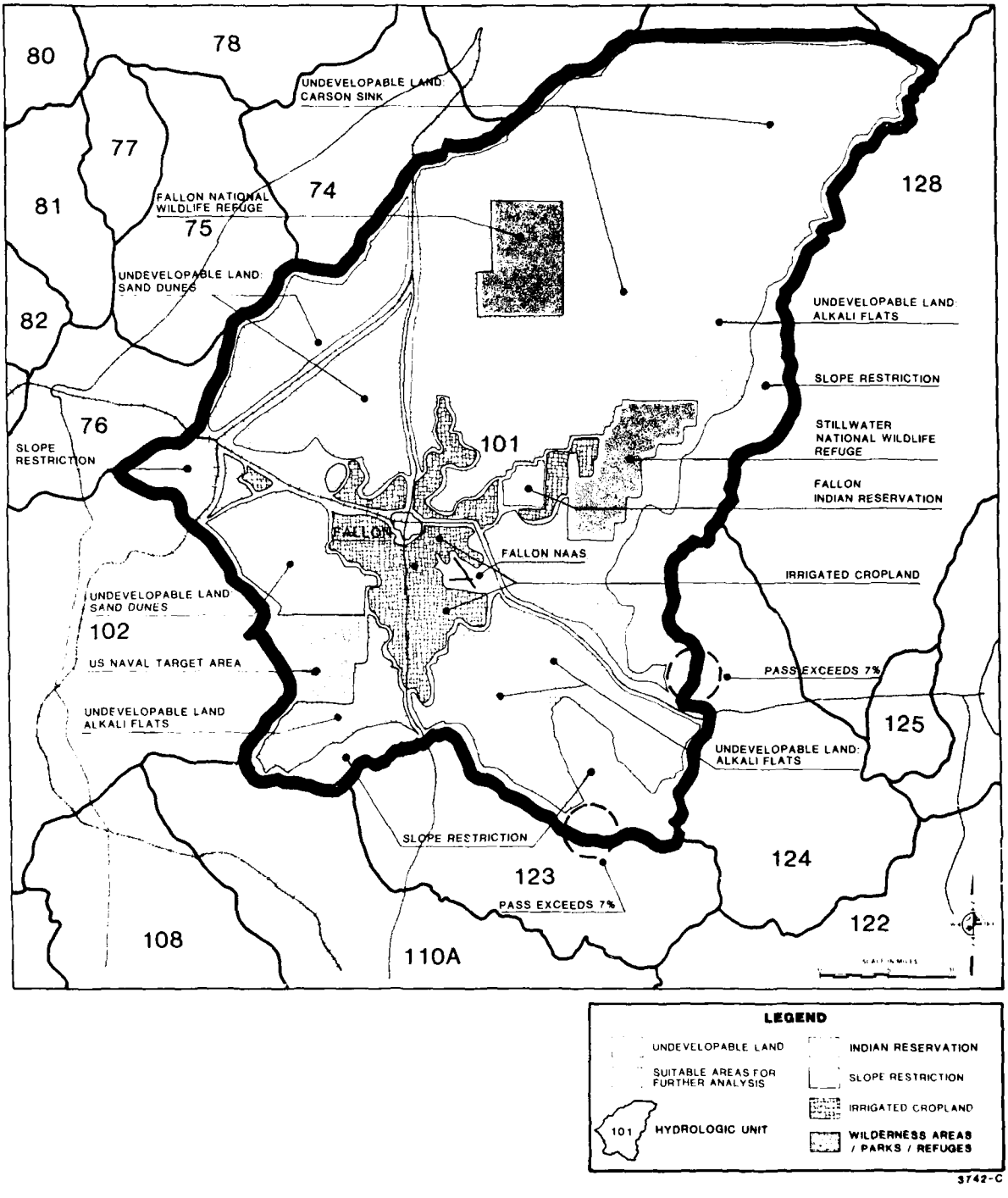


Figure 4.4.1-4. Preliminary candidate OB location, Fallon Naval Air Station, Nevada.

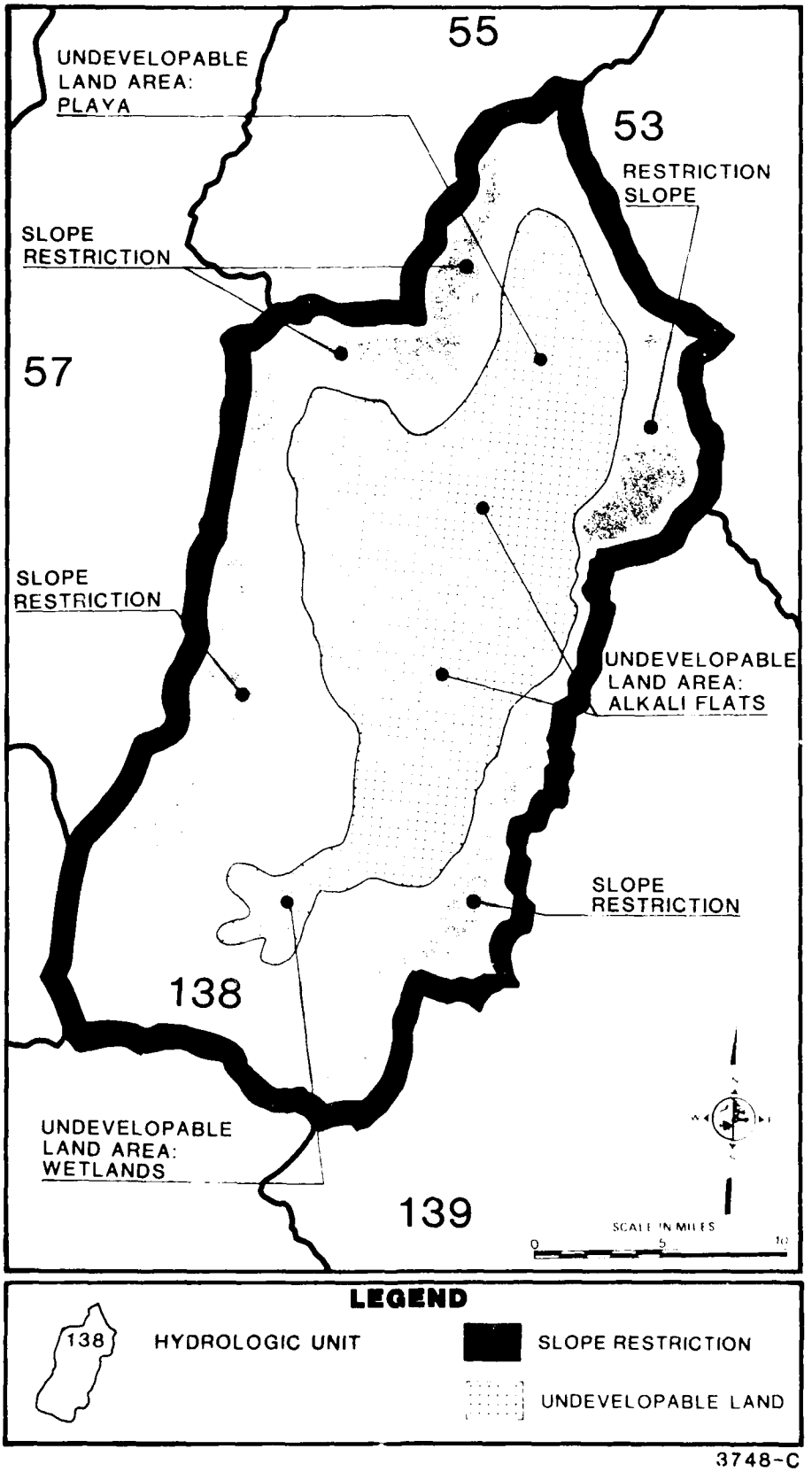


Figure 4.4.1-5. Preliminary candidate OB location, Grass Valley, Nevada.

- Hawthorne Naval Depot, Nevada

  Hawthorne is located about 110 mi from the nearest DDA cluster and about 210 mi from the DDA centroid. Existing facilities are being fully utilized by the United States Navy and additional suitable land available for an OB location is insufficient (see Figure 4.4.1-6).

- Pahroc/Pahranagat Valleys, Nevada

  There is insufficient area to locate an airfield which can satisfy airfield clearance criteria, even with waivers for some obstacles. The location would seriously violate airfield clearance criteria. In addition a DDA protective shelter cluster is proposed for location in Pahroc Valley (see Figure 4.4.1-7).

- Pine Valley, Nevada

  This location would seriously violate airfield clearance criteria. There is insufficient area to locate an airfield which would adequately satisfy this criteria (see Figure 4.4.1-7).

- Tonopah, Nevada

  This location is about 70 mi from an existing railroad network. There is an insufficient water supply at the present. Water in the three nearest valleys is also insufficient to support the anticipated demand, thus restricting import options.

  There would be considerable competition for limited resources from established and proposed mining activity in this area (see Figure 4.4.1-8).

- Dugway Proving Ground, Utah

  The existing facilities are inadequate for an OB and an extensive expansion would be required. Available land in the area that could be suitable for an OB location is contaminated as a result of research and testing in the area. The location is also about 40 mi from the nearest DDA cluster and 270 mi from the DDA centroid (see Figure 4.4.1-9).

- Hill AFT (Ogden Depot), Utah

  This location is about 150 mi from the nearest DDA cluster and about 380 mi from the DDA centroid. The DTN from Hill AFB to the DDA would have to pass through existing communities and developed urban areas, and would also conflict with existing highway and railroad networks.

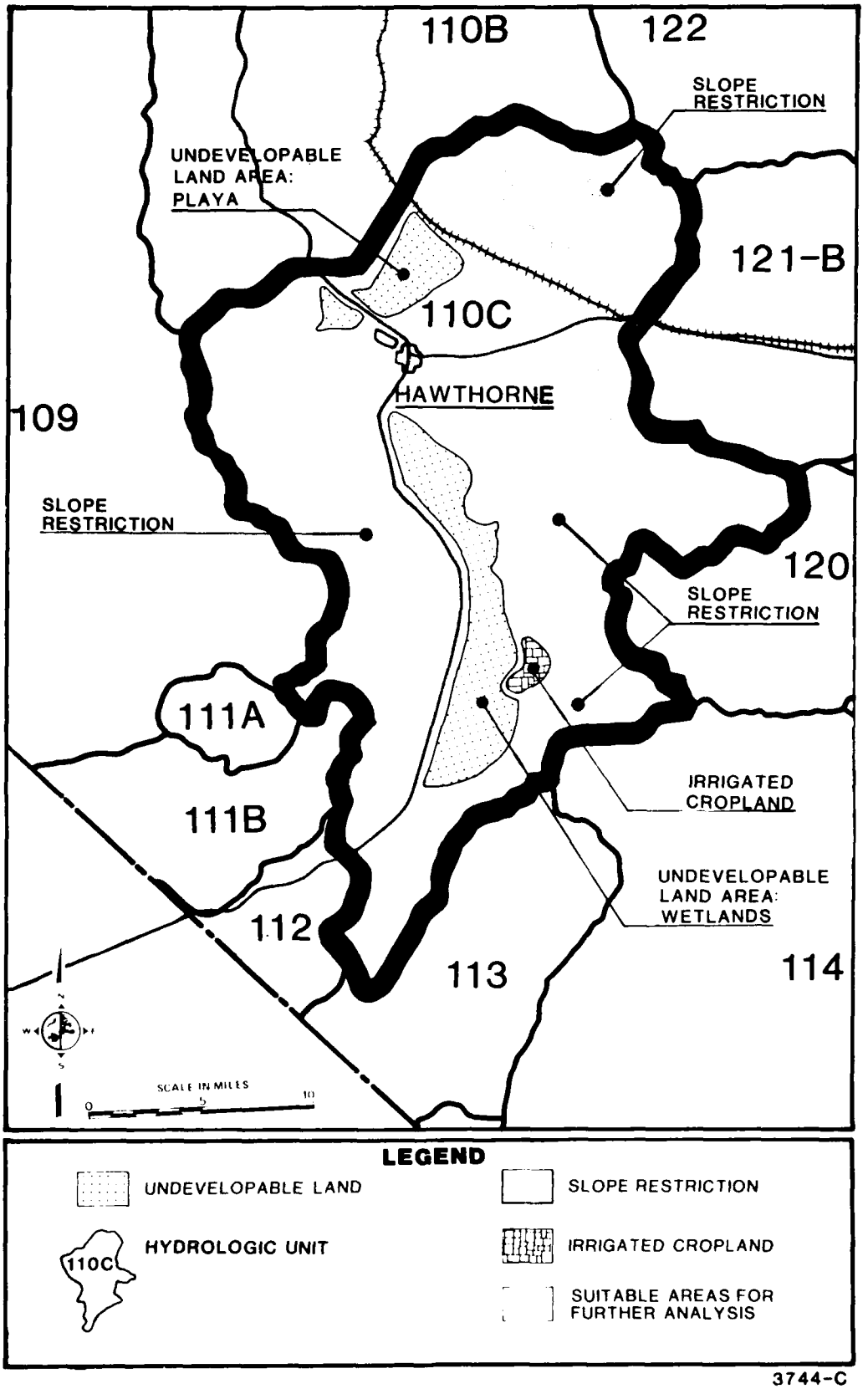


Figure 4.4.1-6. Preliminary candidate OB location, Hawthorne Naval Base, Nevada.

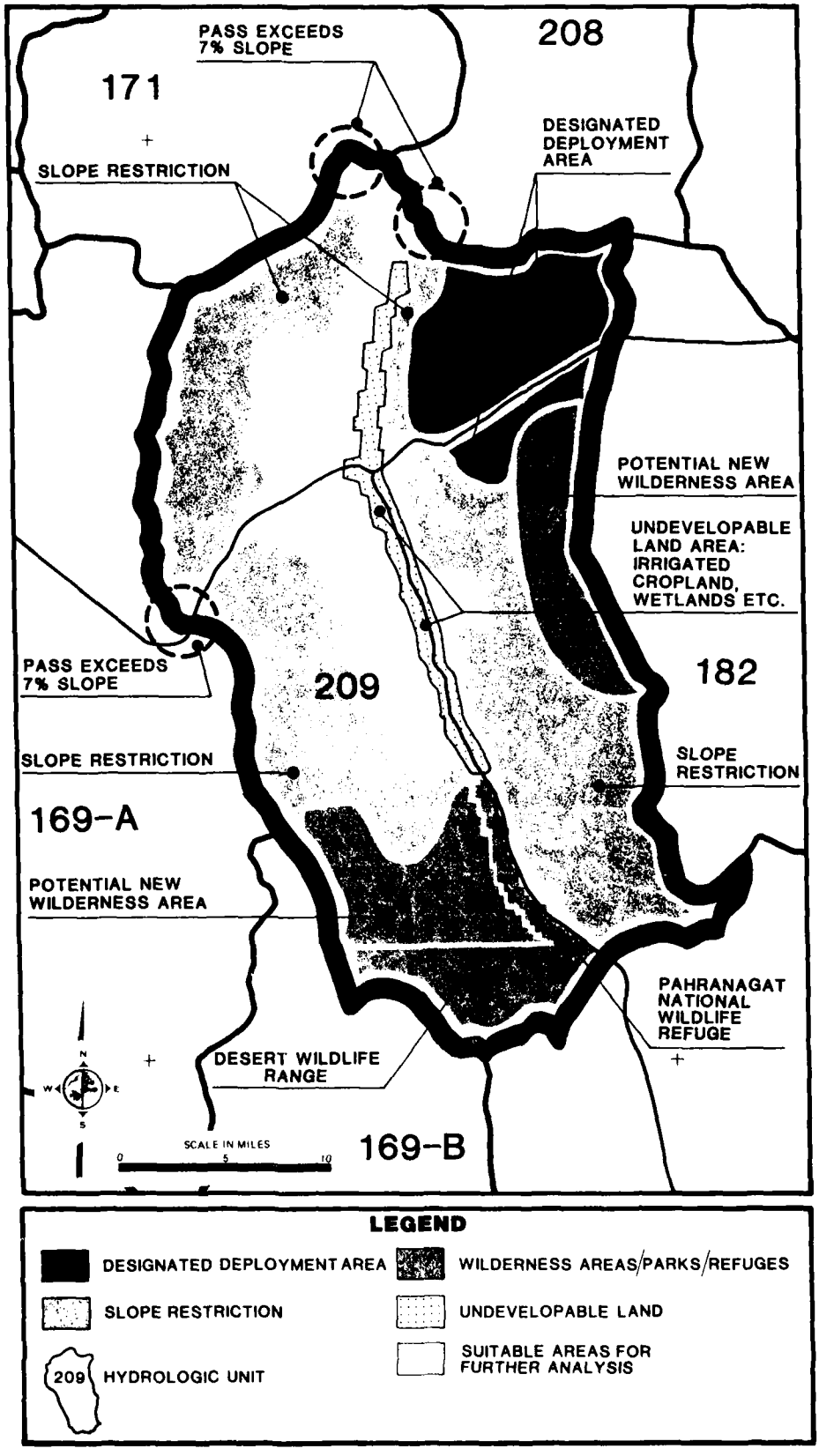


Figure 4.4.1-7. Preliminary candidate OB location, Pahroc/Pahranagat Valleys, Nevada.

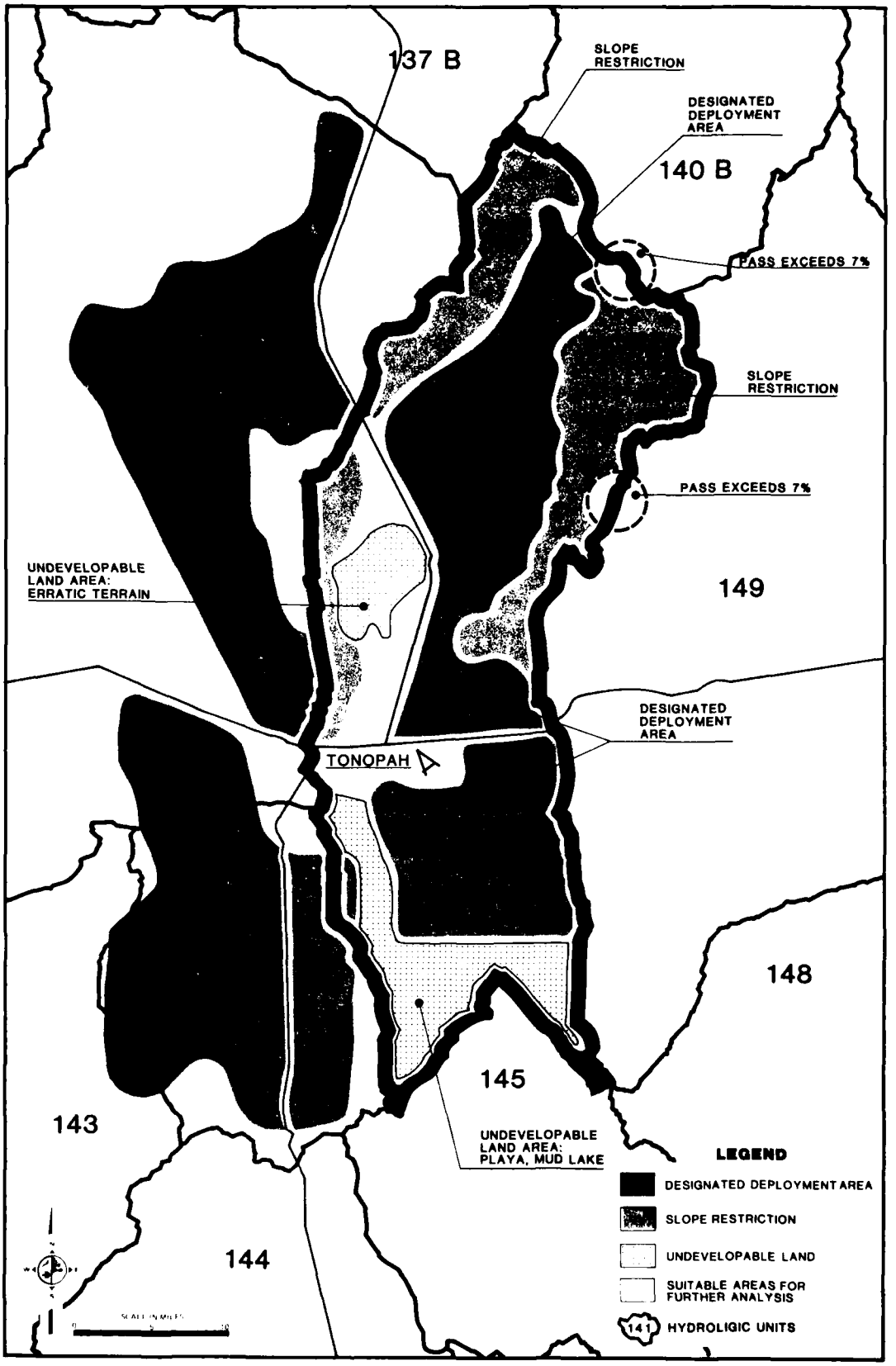


Figure 4.4.1-8. Preliminary candidate OB location, Tonopah, Nevada.

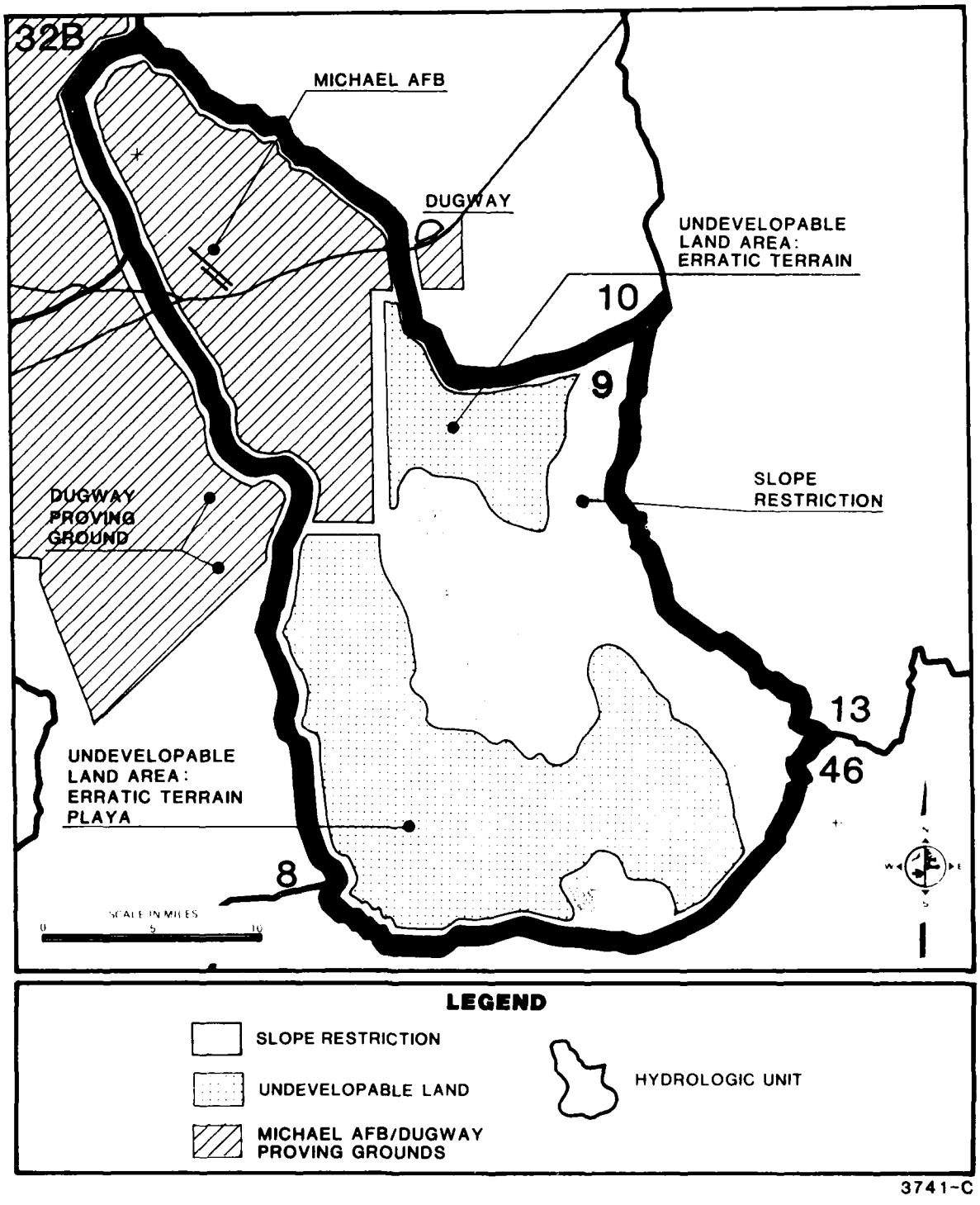


Figure 4.4.1-9. Preliminary candidate OB location, Dugway, Utah.

- Tooele Army Depot, Utah

  The existing facilities are inadequate for an OB location. Much of the existing land available for expansion is presently used for explosive ordnance and chemical storage. Other immediately adjacent areas are contaminated. The location is also about 90 mi from the nearest DDA cluster and about 320 mi from the DDA centroid (see Figure 4.4.1-10).

- Wendover Bombing Range, Utah

  The location is about 60 mi from the nearest DDA cluster and about 310 mi from the DDA centroid. These distances are excessive for security and operations/maintenance response times and cost (see Figure 4.4.1-11).

Texas/New Mexico (4.4.2)

- Amarillo AFB, Texas

  This location is about 50 mi from the nearest DDA cluster and about 130 mi to the DDA centroid. The base has been sold and is now being used for private commercial purposes.

- Reese AFB (Lubbock), Texas

  This location is about 70 mi from the nearest DDA cluster and about 140 mi from the DDA centroid. Existing facilities are fully utilized in support of the USAF undergraduate pilot training program.

- Webb AFB (Big Spring), Texas

  This location is about 260 mi from the nearest DDA cluster and about 330 mi from the DDA centroid. The base has been sold and is now being used for private commercial purposes.

- Tucumcari, New Mexico

  This location has a relatively high water table which conflicts with geotechnical siting criteria, and which could acversely affect major construction. Tucumcari is not as centrally located, with respect to the DDA, as Cannon AFB. The relative nearness of Cannon AFB and Tucumcari eliminates this location as use of existing Cannon facilities is much more cost effective.

- Walker AFB (Roswell), New Mexico

  This location is about 30 mi from the nearest DDA cluster and about 130 mi from the DDA centroid. The base has been sold and is now being used for private commercial purposes.

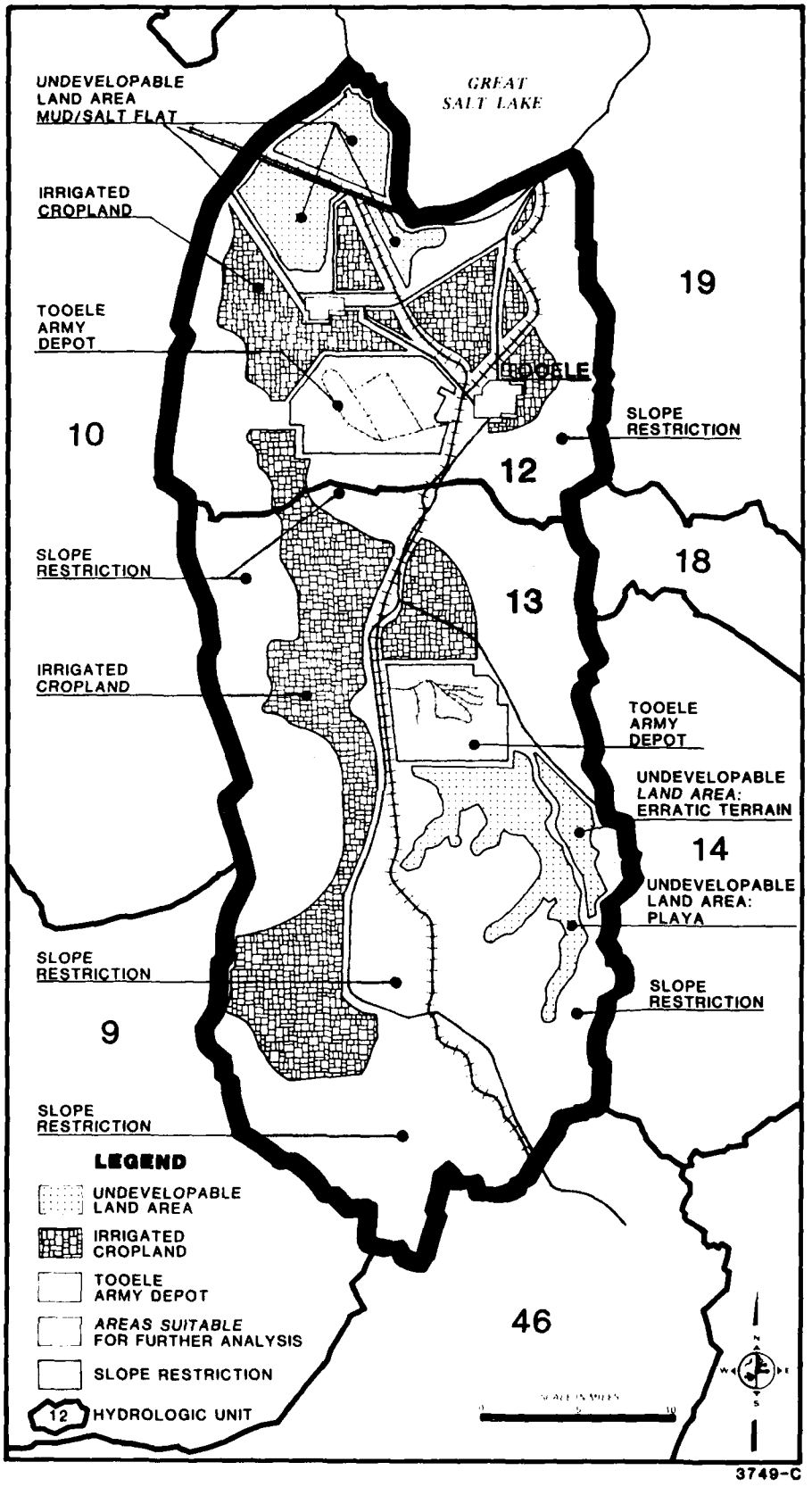


Figure 4.4.1-10. Preliminary candidate OB location, Tooele, Utah.

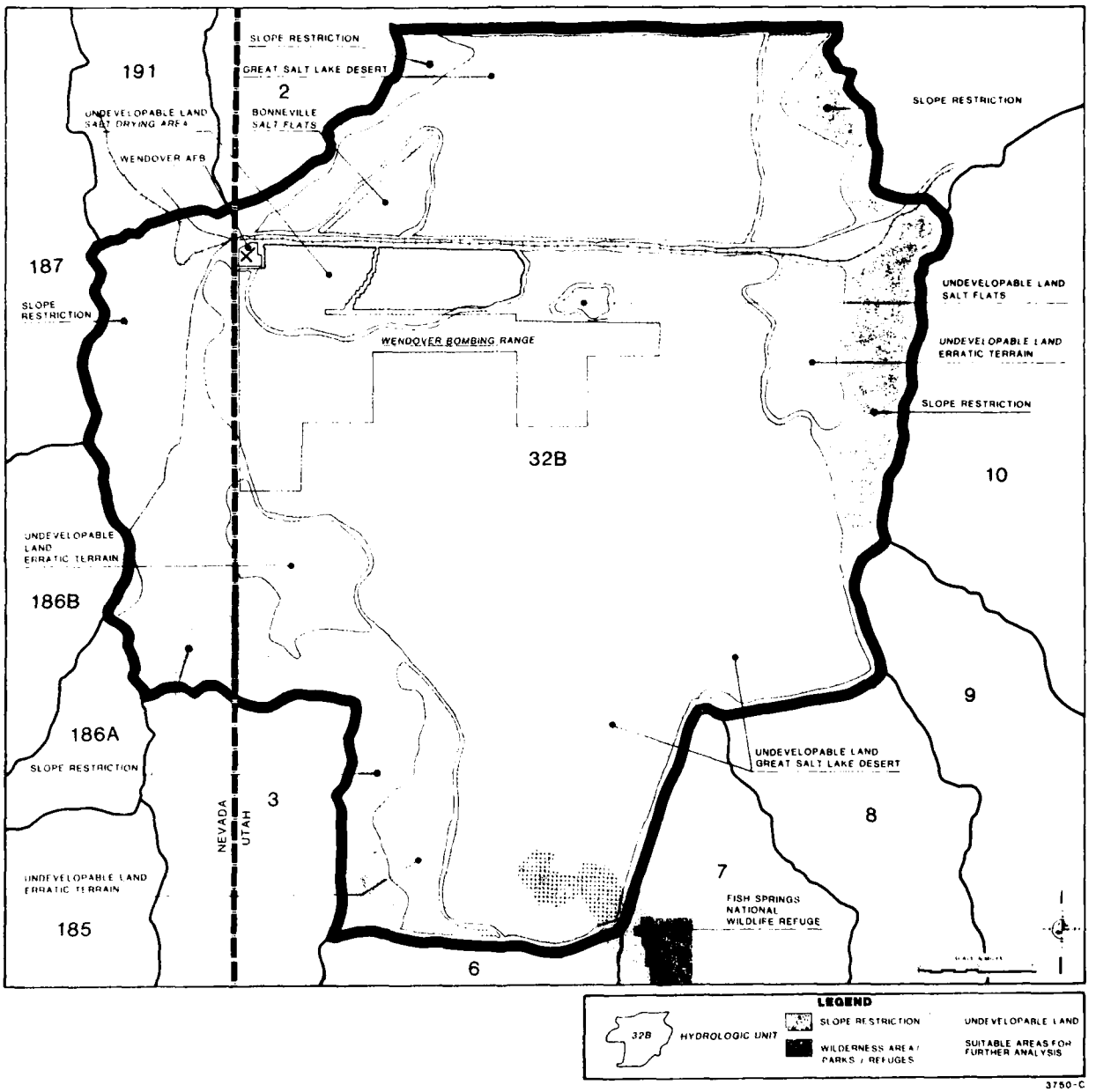


Figure 4.4.1-11. Preliminary candidate OB location, Wendover, Utah.

4.5 CANDIDATE OB LOCATIONS

Figures 4.5-1 and 4.5-2 illustrate the remaining seven community vicinities which were identified as suitable for OB location and yet further, in-depth analysis. These are:

Nevada

- Coyote Spring (Clark County)*
- Ely

Utah

- Beryl*
- Delta
- Milford*

Texas

- Dalhart

New Mexico

- Cannon AFB (Clovis)*

4.6 SUITABILITY ZONE FOR OB LOCATIONS

Each of the seven vicinities determined to be suitable for an OB location were then evaluated in yet additional detail to designate a suitability zone at each vicinity within which an OB could be precisely located after subsequent site-specific studies in the Tier 2 level of analysis (see the Tiering discussion in the DEIS, Chapter 1, Section 1.7.2). Again a method of graphic analysis was applied to determine the OB suitability zones. This method of representing criteria as a series of graphic overlays then applied to a base map is an accepted methodology in land use planning analysis, and decisionmaking, however. This detailed application concentrates on the specific hydrologic subunits or counties within which the seven vicinities are located, to define OB suitable zones.

Each of the criteria previously described were illustrated at a much more site-specific level to define the suitability zone for a potentital OB location at each community vicinity. Areas within the hydrologic unit, or county which do not satisfy the siting criteria are identified as the graphic overlay process proceeds. This process supports the basic approach of "potential impact mitigation by avoidance" where possible. The base maps used are actually composites made from data included on a number of map references such as United States Geological Survey maps (at 1:250,000, 1:62,500, and 1:24,000 scales) infrared satellite imagery (LANDSAT), and in some cases high altitude aircraft imagery. Graphic overlays were created from a number of sources

*In the event that an OB is located at any of these vicinities, the OB location is suitable as either a first or second OB. The rationale for this determination is presented in Section 5.0.

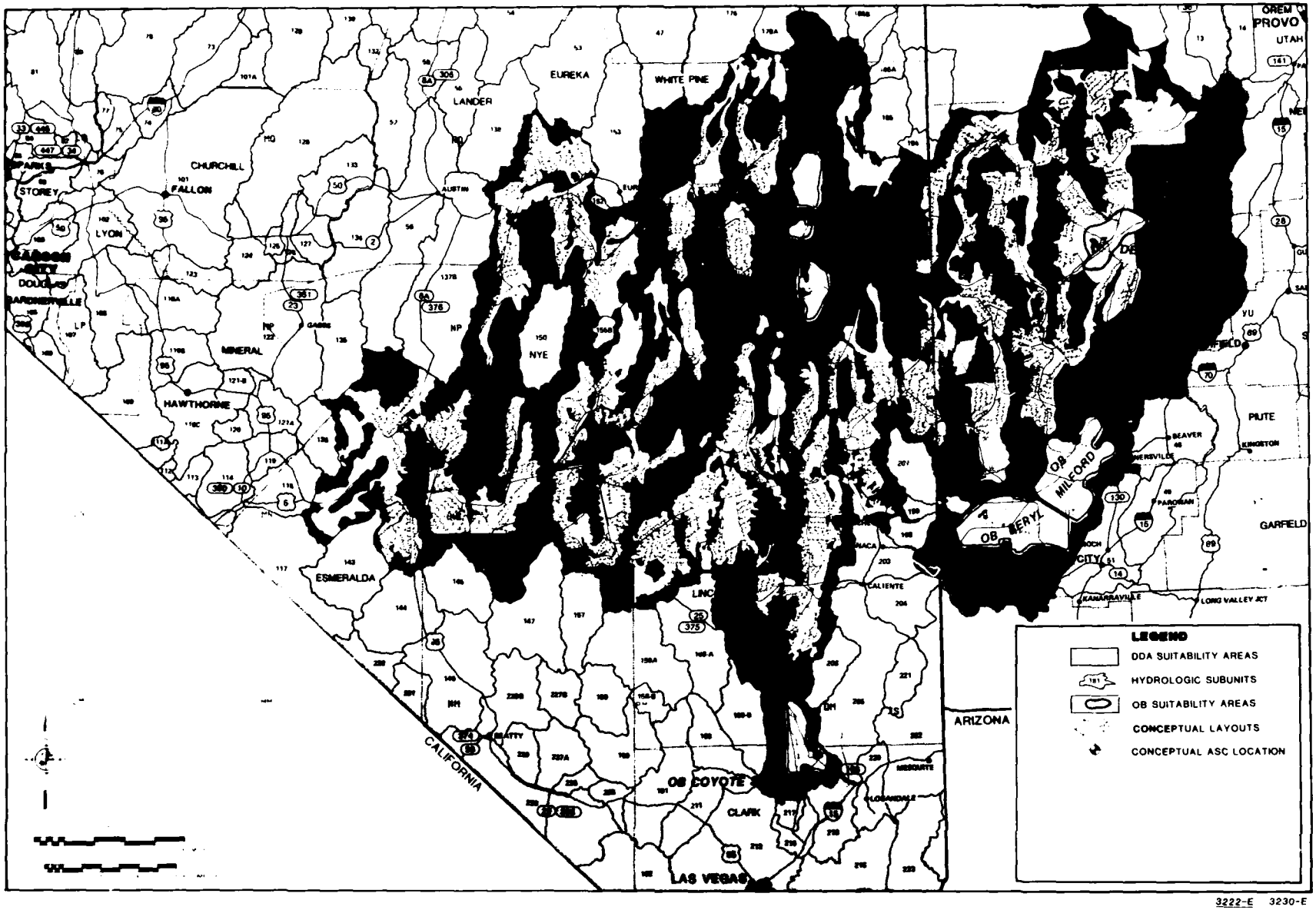


Figure 4.5-1. Candidate OB sites for further analysis in the Nevada/Utah study region.

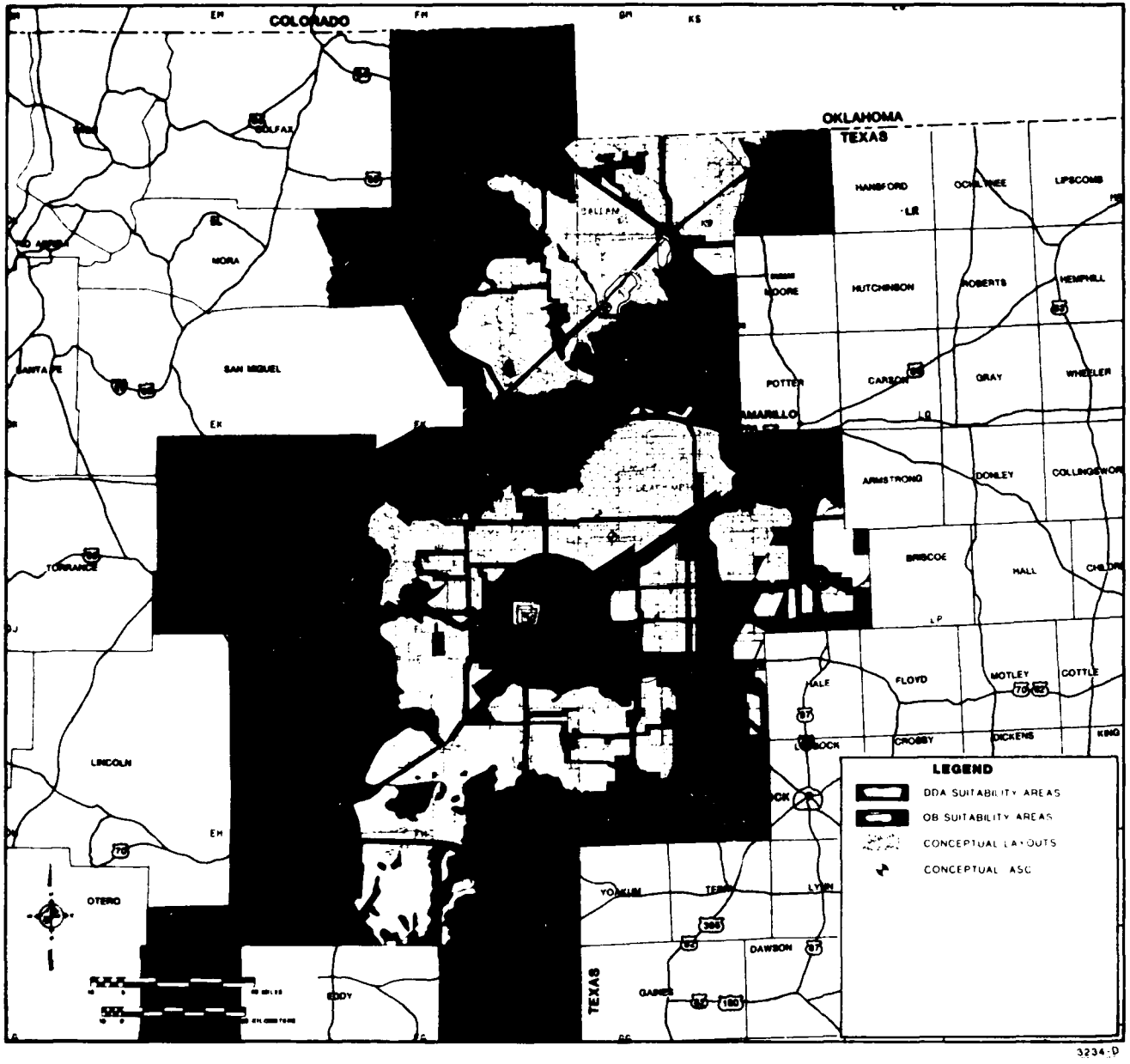


Figure 4.5-2. Candidate OB sites for further analysis, Texas/New Mexico.

and carefully registered on the base map. In many cases computer-generated overlays were used which identified the precise location of cultural and environmental resources.

LANDSAT imagery clearly identifies irrigated agricultural areas in each of the candidate vicinities. As avoidance of such areas where possible is a siting criteria, these areas are identified on the base maps and generally eliminated from further consideration.

This procedure is continued with each criteria for each candidate vicinity until all of the unsuitable land has been identified. Therefore, the remaining area generally satisfies the criteria for an OB location, and is designated as the OB suitability zone within which an OB could be located. Sections 4.6.1 and 4.6.2 describe the process of analysis for each community vicinity and the resulting OB suitability zones.

Within each suitability zone an OB was conceptually located to demonstrate the ability to satisfy the various criteria for airfield operation, required land area, geotechnical suitability, and desirable site characteristics. However, this tentative OB location is illustrated only to demonstrate at least one potential OB location which satisfies the OB siting criteria. Other potential OB locations exist in each suitability zone. The conceptual layout also identifies the major components of the potential OB; however, there are many potential base development patterns. Each suitability zone avoided cultural and environmental exclusions.

As previously stated, within each suitability zone there are numerous potential sites for an OB location; however, until the necessary planning, architectual, engineering, and site-specific environmental studies are conducted (in Tier 2 analysis), the optimum site cannot be determined. The size, shape, and number of the suitability zones varies at each of the seven alternative OB vicinities based on the application of the criteria previously discussed.

As discussed, in Chapter 1 of the DEIS the Tier 2 level of analysis will involve development of an operating base comprehensive plan (BCP) which includes input from, and coordination with, state and local planning agencies. During the development process of the BCP, a specific site for the operating base within the suitability zone will be selected. The boundary of the base and the base development pattern, including the airfield, work center, community center, housing, recreation areas, road network, etc. will also be defined. The actual OB site selection process and OB layout will be based on these further planning and environmental field studies, operational and support requirements, optimum avoidance of known highly sensitive environmental areas, and use of desirable site characteristics. While there is no location which precisely meets all of the ideal criteria of an OB location, the BCP development process will select a site within the suitability zone which optimizes the criteria and specific site characteristics.

It is also evident that community development will occur offbase in response to the increase in M-X related employment and population growth both in the short and long term. During the development process of the BCP, recommendation will be made as to where the development of a civilian support community might best be encouraged. However, if an orderly, "planned" growth for any specific community or area is to occur, state and local planning agencies will have to work closely with private developers. This EIS only identifies various locations that appear to have the potential for the development of a civilian support community. Other areas may be identified during subsequent studies.

NEVADA/UTAH DEPLOYMENT AREA (4.6.1)

Coyote Spring Valley

Figure 4.6.1-1 graphically illustrates the composite of the siting criteria overlays applied to the 210 and 219 vicinity of the Coyote Spring Valley, Nevada base map. Hydrologic subunit numbers 210 and 219 are the basic unit of analysis within which the OB suitability zone will be defined. As can be seen, the suitable area is confined by either existing or proposed wilderness areas. In addition, there are steep slopes to the north and east which conflict with airfield criteria and exceed suitable construction grades. However, the wilderness areas are considered to be a more significant criteria and are so indicated.

The proposed expansion of the Moapa Indian Reservation is also identified, as are significant water drainage systems which are not suitable for development without substantial water channelization. The remaining land generally satisfies the siting criteria and is considered as suitable for an OB location. However, to ensure sufficient area is included in the suitability zone to allow siting flexibility, a portion of the proposed wilderness areas to the west and to the north are included in the suitability zone. This possible conflict with Bureau of Land Management proposed land use has been identified. These proposals are for expansion of existing wilderness areas and are intended as buffer-areas, and indications are that the proposals could be modified if Coyote Spring Valley is selected as an OB location. The impact of human activity on the wilderness area would be essentially the same, as there is no physical boundary which would clearly buffer the existing wilderness area (such as steep hills, etc.). A proposed power transmission line transits the suitable area, and conflicts with the conceptual OB location. Should this vicinity be selected for an OB location the proposed transmission could be relocated, if development of the BCP identifies the conceptual OB location within the suitability zone as the most desirable. There are other features within the suitability zone which will influence the specific site selection process during development of the BCP. For instance, this suitability zone includes numerous water drainage systems which will likely be

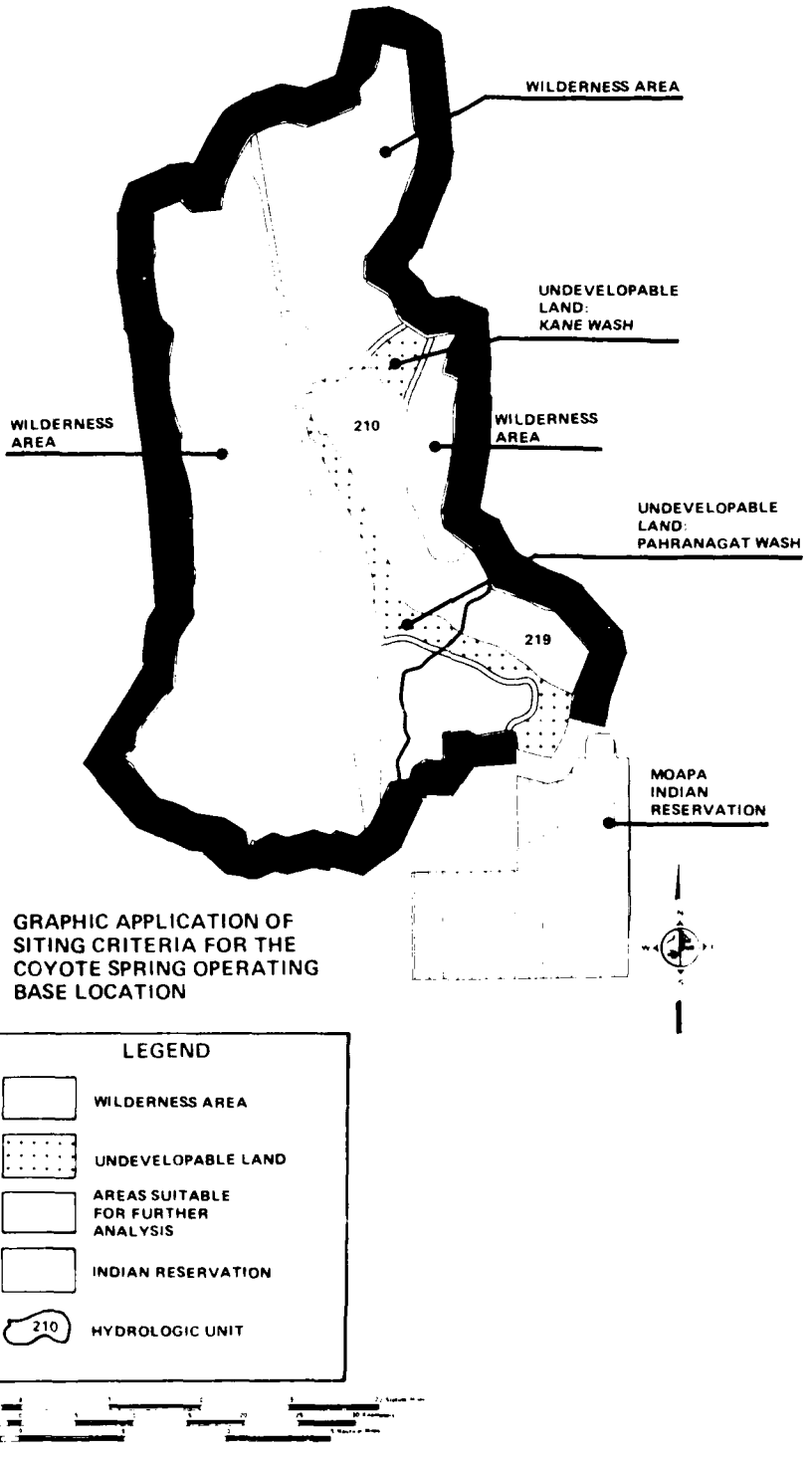


Figure 4.6.1-1. Graphic application of siting criteria for the Coyote Spring OB location.

avoided in response to specific engineering and economic considerations; however, there are several areas within the suitability zone where an OB might be located.

Figure 4.6.1-2 illustrates the suitability zone for either a first or second operating base located in the vicinity of Coyote Spring Valley. A conceptual location of an OB within the suitability zone is identified and the criteria which determined the shape, or boundary, of the suitability zone are annotated along its perimeter. A conceptual layout of the OB with the major component of the OB/DAA identified is also illustrated, and areas of potential development for offbase civilian support communities identified. Facilities were conceptually sited to reflect one possible optimization of siting criteria. For example the airfield is located in an area which demonstrates compliance with airspace criteria, and the conceptual housing area is compact and takes advantage of south-east slopes for solar design considerations. Figure 4.6.1-3 illustrates the suitability zone superimposed over a color infrared LANDSAT image which clearly shows the terrain features in the area.

Ely

Figure 4.6.1-4 graphically illustrates the composite of the siting criteria overlays applied to the base map of the vicinity of Ely, Nevada. Hydrologic subunit number 179 is the basic unit of analysis within which the Ely OB suitability zone will be defined. Actually, three suitable areas emerge from the analysis. The one to the north of the McGill tailings pond is defined on the east by steep slopes and on the west by agricultural areas, wetlands, and steep slopes; to the south by the tailings pond and slopes. The northern boundary of this area was derived due to the narrowing of the valley, and distance from Ely. The suitable area just north of Ely was identified based on the potential joint-utilization of the municipal Yelland Airfield facilities. Commercial passenger service (using multiple jet engine aircraft) is presently provided via these facilities. There are numerous examples of joint-use commercial/military airfield operations throughout the country, which normally are mutually advantageous. The boundary of this area was determined by steep slopes, agricultural areas, and a desired buffer zone reflecting noise attenuation and possible future community encroachment.

The suitable area to the south of Ely is primarily defined by the steep slopes at the valley edges. However, the Cumins Meadow wetlands defined the northern edge of the area and the narrowing valley, the southern edge. The Humboldt National Forest and Ward Charcoal Ovens State Park also were eliminated as suitable land. An area identified as a potential seismic fault zone was also excluded. Although other potential seismic areas are known to exist in the valley, more

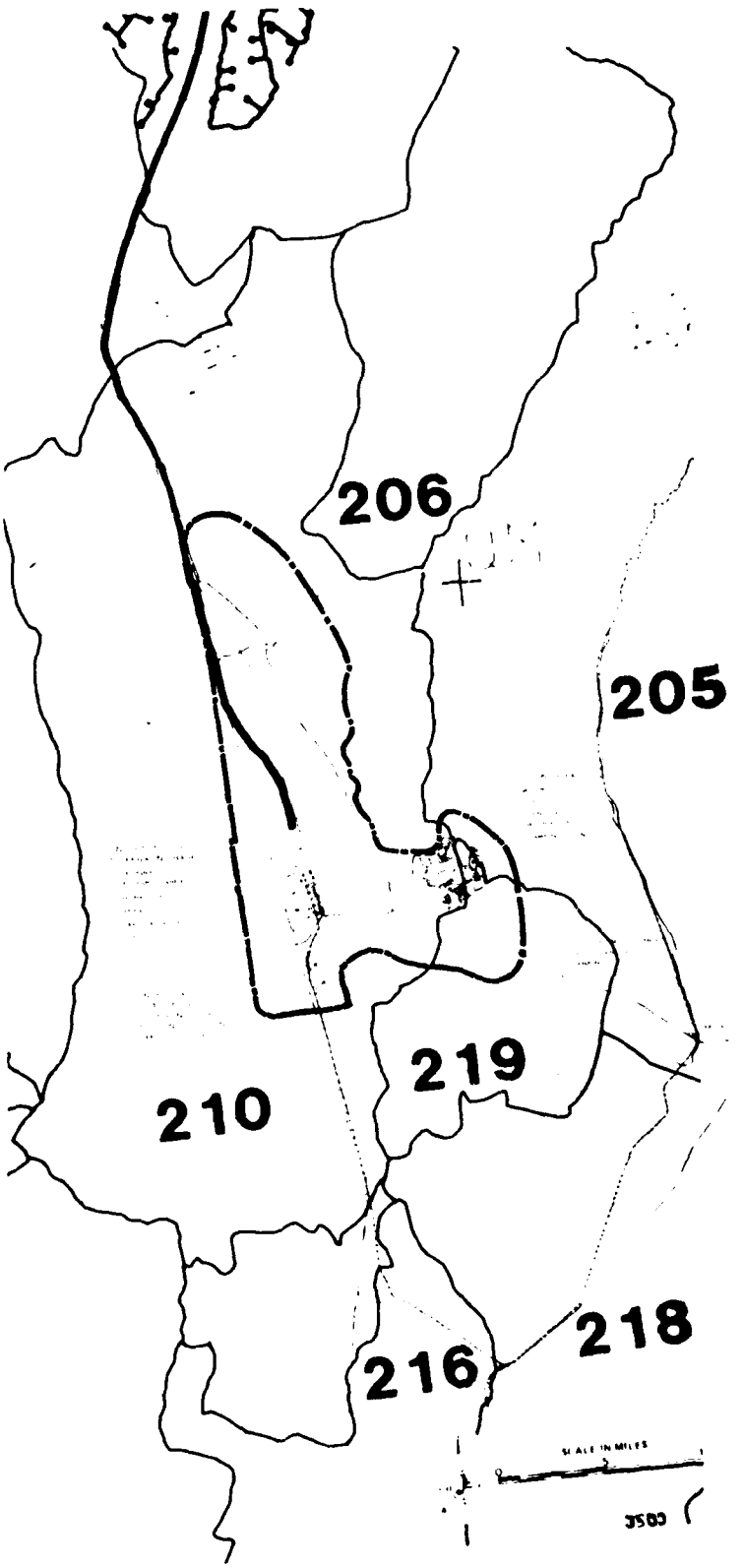


Figure 4.6.1-2. Operating base location suitability zone at Coyote Spring Valley, Nevada.

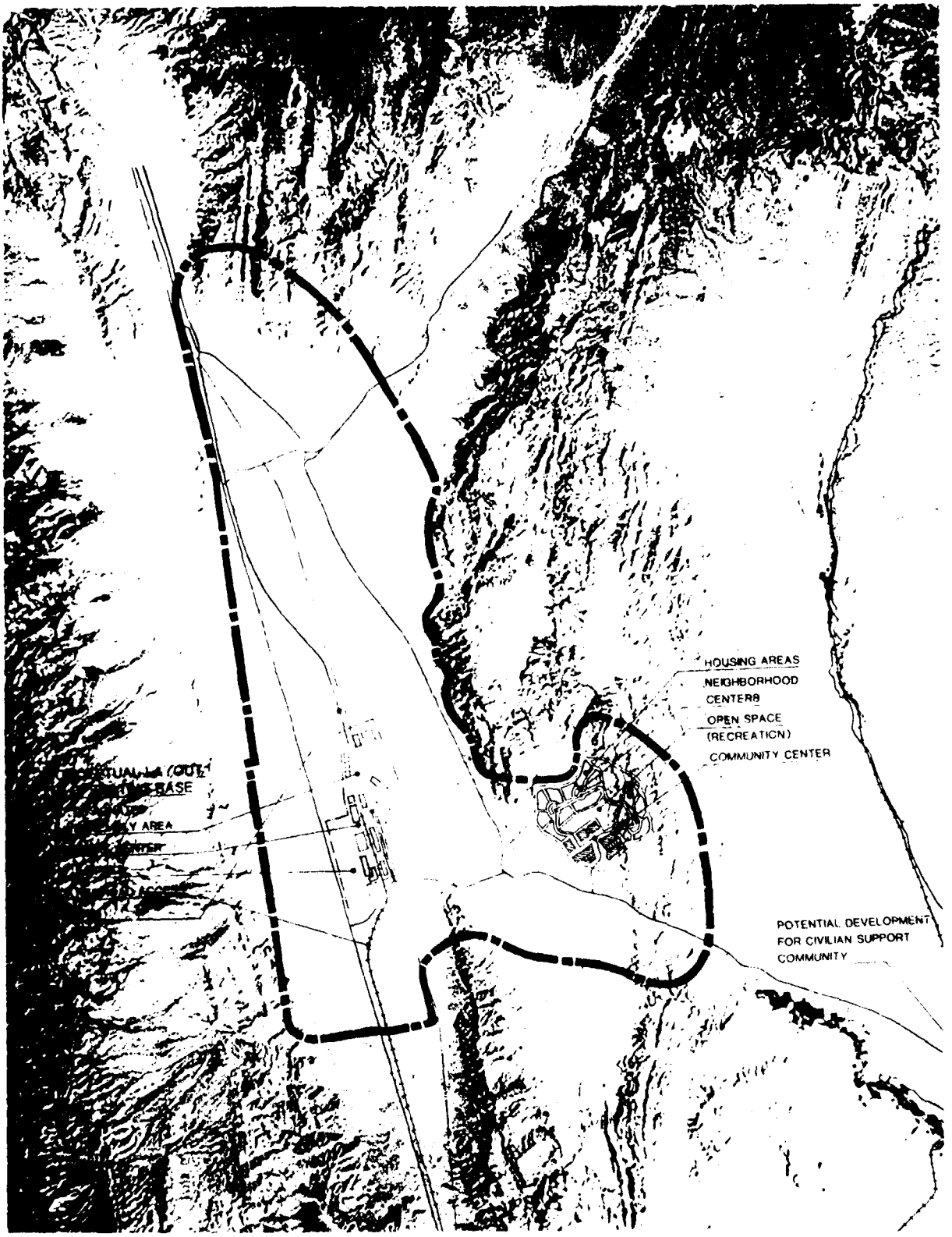
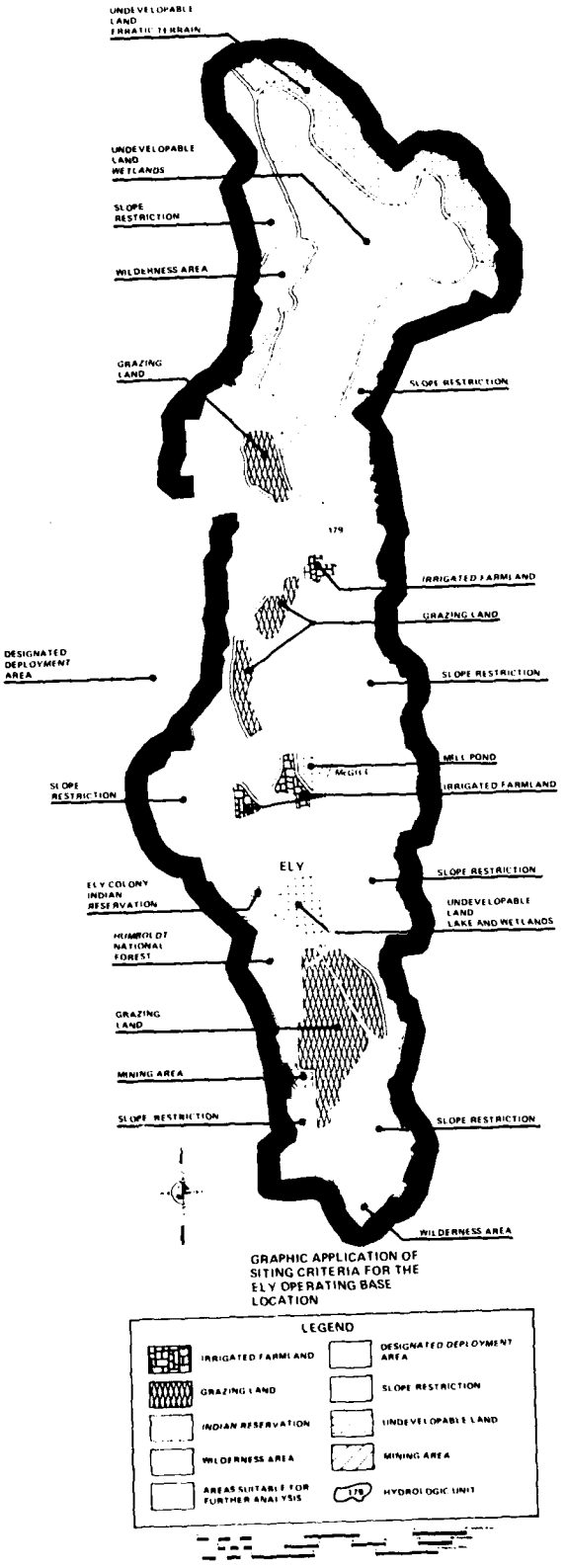


Figure 4.6.1-3. Operating base location availability zone at Coyote Spring Valley, Nevada, superimposed on a LANDSAT image. See Fig. 2.1-15, page 2-45 of DEIS.



GRAPHIC APPLICATION OF SITING CRITERIA FOR THE ELY OPERATING BASE LOCATION

Figure 4.6.1-4. Graphic application of siting criteria for the Ely OB location.

site-specific engineering analysis is required to determine if they are active and/or should be avoided. While most of this area is public land, several large areas have been permitted by the Bureau of Land Management for grazing. Use of public land for private grazing is not an exclusionary site criteria and does not eliminate this area from consideration. It has, however, been identified as an existing land use.

As with all candidate OB locations, if Ely is selected as an OB location, other features within the suitability zone will influence the site selection process during development of the BCP.

Figure 4.6.1-5 illustrates the three suitability zones for a second operating base in the vicinity of Ely. The conceptual OB location is illustrated in the suitability zone to the south of Ely; however, there are several areas in each zone where an OB could be located. A conceptual layout of the OB with the major components of the identified construction camp and marshalling yard is also illustrated and areas of potential development for offbase civilian support communities identified. The airfield was conceptually sited to demonstrate satisfaction of area and airspace criteria and optimized siting. Housing areas are conceptually sited on south-east slopes for solar design optimization. Figures 4.5.1-6 and 7 illustrate the suitability zones superimposed over a color infrared LANDSAT image, which clearly shows the terrain features. Agricultural areas, wetlands, and riparian growth appear as dark red areas.

Beryl

Figure 4.6.1-8 graphically illustrates the composite of the siting criteria overlays applied to the base map of the vicinity of Beryl, Utah (this figure also includes the Milford vicinity). Hydrologic subunit numbers 52 and 53 form the basic unit of analysis within which the OB suitability zone will be defined. The suitable area or zone which emerges from the analysis is defined to the north due to slope restrictions. In several areas existing roads have been used to define the suitability zone where slope restrictions, or other siting criteria conflicts, occur relatively near these roads. This occurs in one area to the north but primarily on the southern boundary along an existing road with adjacent steep slopes and/or agricultural areas. The western boundary was defined by the narrowing of the valley, the eastern boundary by land which is disaggregated, heavily water-coursed, and probably not suitable for construction.

During the concurrent analysis of the Beryl and Milford vicinities a contiguous suitable area emerged which includes both Milford and Beryl. This area is included in hydrologic subunits 50, 52, and 53. An arbitrary division of this large area was made to identify separate suitability zones for each vicinity. As can be seen in the figure, the existing road from Lund towards Cedar City was selected as this boundary.

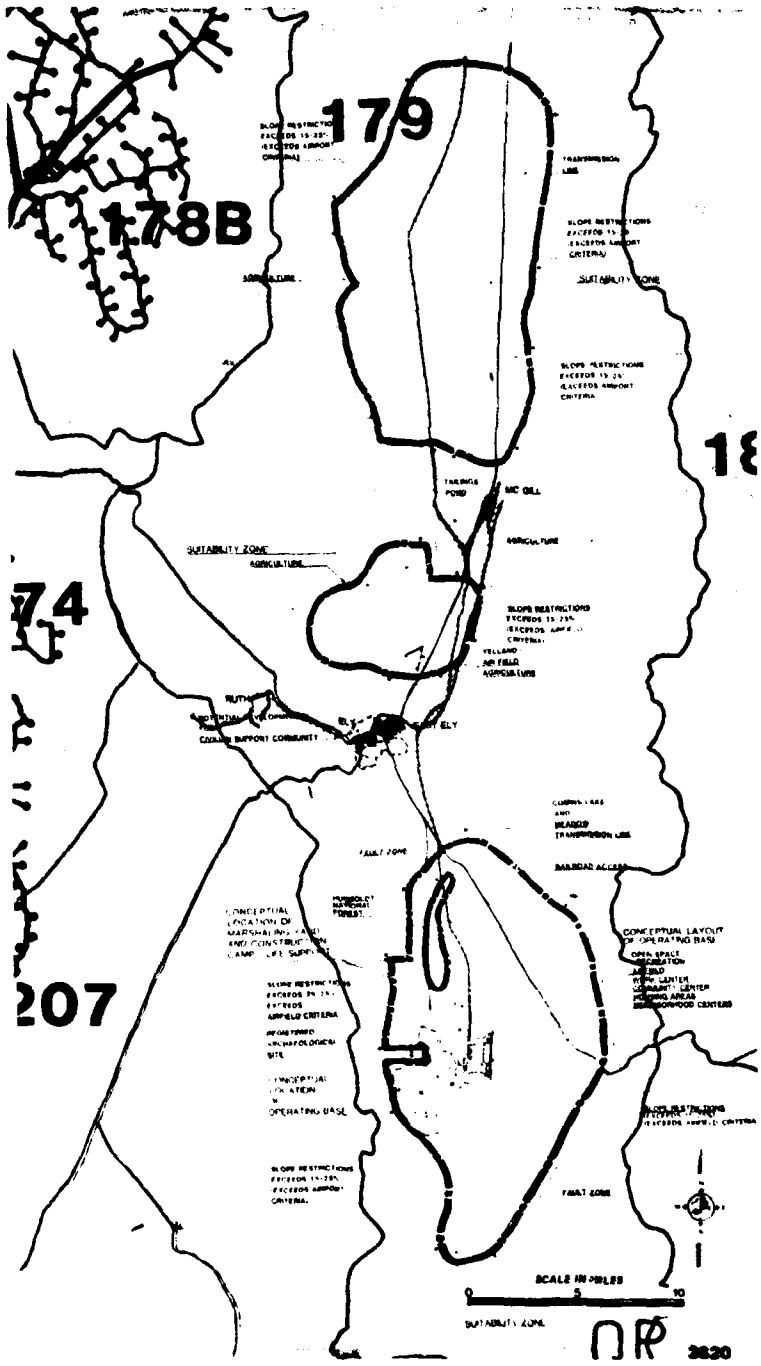


Figure 4.6.1-5. Operating base location suitability zone at Ely, Nevada.

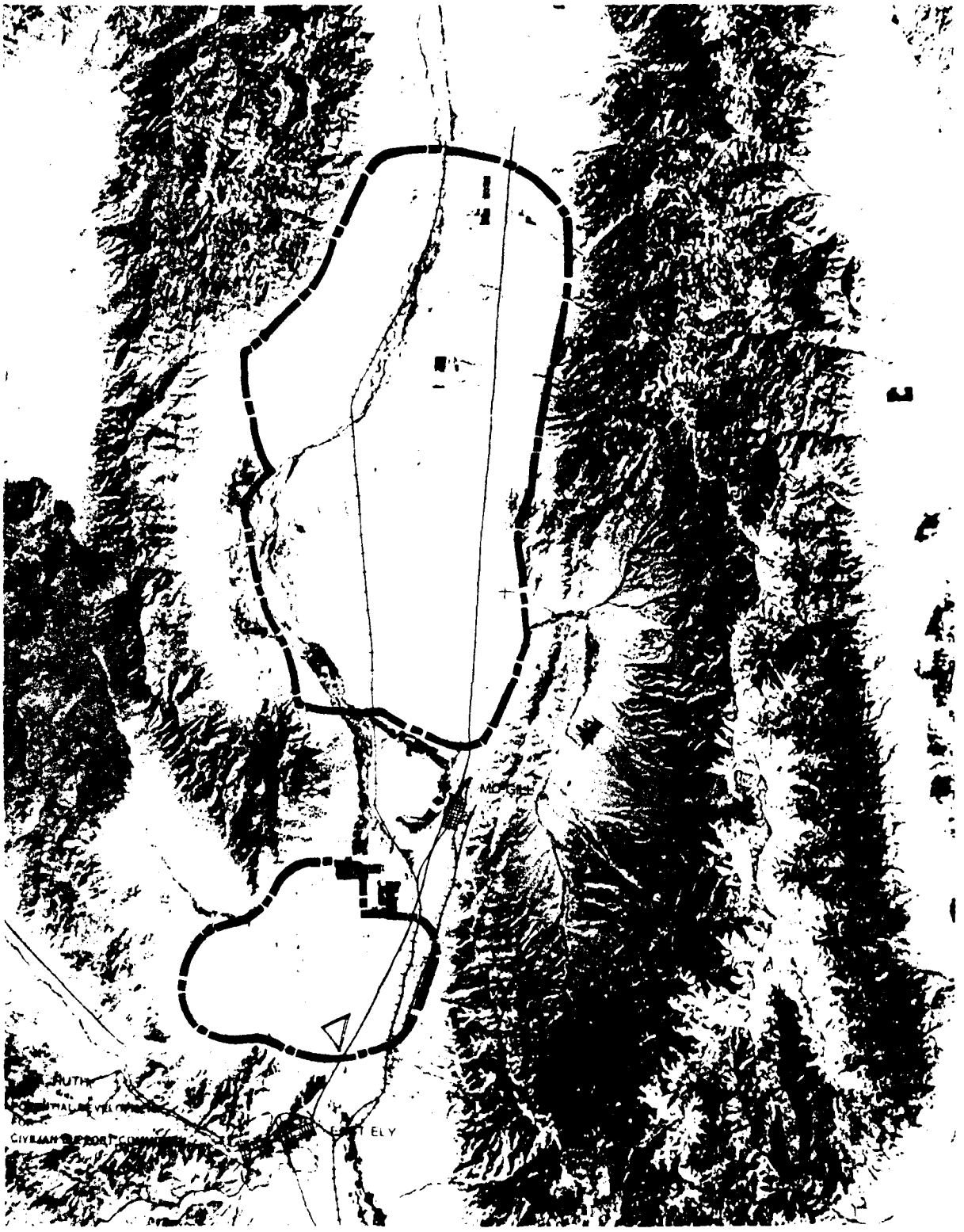


Figure 4.2.1-6. Operating base location suitability zone at Ely-North, Nevada, superimposed on LANDSAT image. See Fig. 2.1-17 of DEIS.

[illegible] operating base location suitability zone at Ely-South, Nevada, superimposed on LANDSAT [illegible]. See Fig. 2.1-17A.

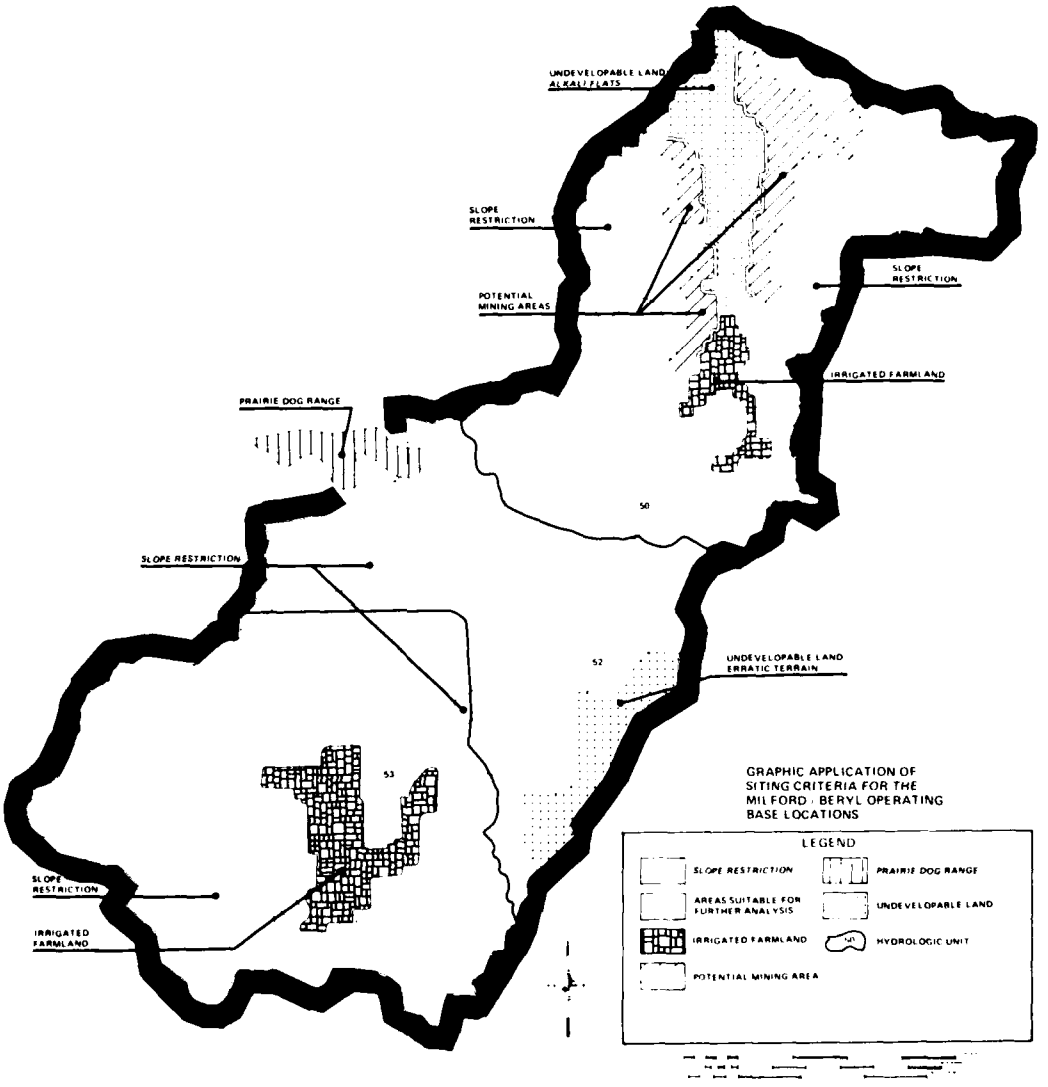


Figure 4.6.1-8. Graphic application of siting criteria for the Beryl/Milford OB locations.

Within the area identified as suitable for an OB location in the Beryl vicinity are other features which will influence specific facility siting. A steep slope area is identified and there are sand dune, playa, and heavily water-coursed areas which also would likely be avoided. In addition, a proposed power transmission line transits the suitable area. This conflict of land use has been identified and the conceptual OB layout illustrated avoids the line. It would be possible to relocate this proposed line should this vicinity be selected as an OB location and if the most desirable OB location conflicts with this power line. This would be determined during Tier 2 analysis with development of the BCP.

Figure 4.6.1-9 illustrates the suitability zone for either a first or second operating base located in the vicinity of Beryl. A conceptual OB within the suitability zone is identified and the criteria which determined the boundary of the suitability zone are annotated along its perimeter. A conceptual layout of the OB with the major components of the OB/DAA identified is also illustrated and areas of potential development for offbase civilian support communities identified. The OB facilities were conceptually located to demonstrate one example of site criteria suitability. As can be seen, again the housing areas and compact OB facilities are conceptually located for use of slope and orientation of optimal solar design application. Figure 4.6.1-10 illustrates the suitability zone superimposed over a color infrared LANDSAT image, which clearly shows the terrain features and agricultural areas (which appear as dark red).

Milford

Figure 4.6.1-8 graphically illustrates the composite of the siting criteria overlays applied to the base map of the vicinity of Milford, Utah (this figure also includes the Beryl vicinity). Hydrologic subunit numbers 50 and 52 form the basic unit of analysis within which the OB suitability zone will be defined. The previous discussion on the suitability zone for an OB location in the vicinity of Beryl identified the contiguous nature of the Beryl/Milford suitability zones. Therefore, the road from Lund to Cedar City becomes the southwestern boundary of the Milford suitability zone. As can be seen, slope restrictions, agricultural areas and avoidance of potential community encroachment primarily define the remaining boundary of the suitable area. Two proposed power transmission lines transit the suitable area, which conflict with the conceptual OB location. If this vicinity should be selected as an OB location it would be possible to relocate these proposed lines if the conceptual location illustrated proves to be the most desirable, as determined by the development of the BCP in Tier 2 analysis.

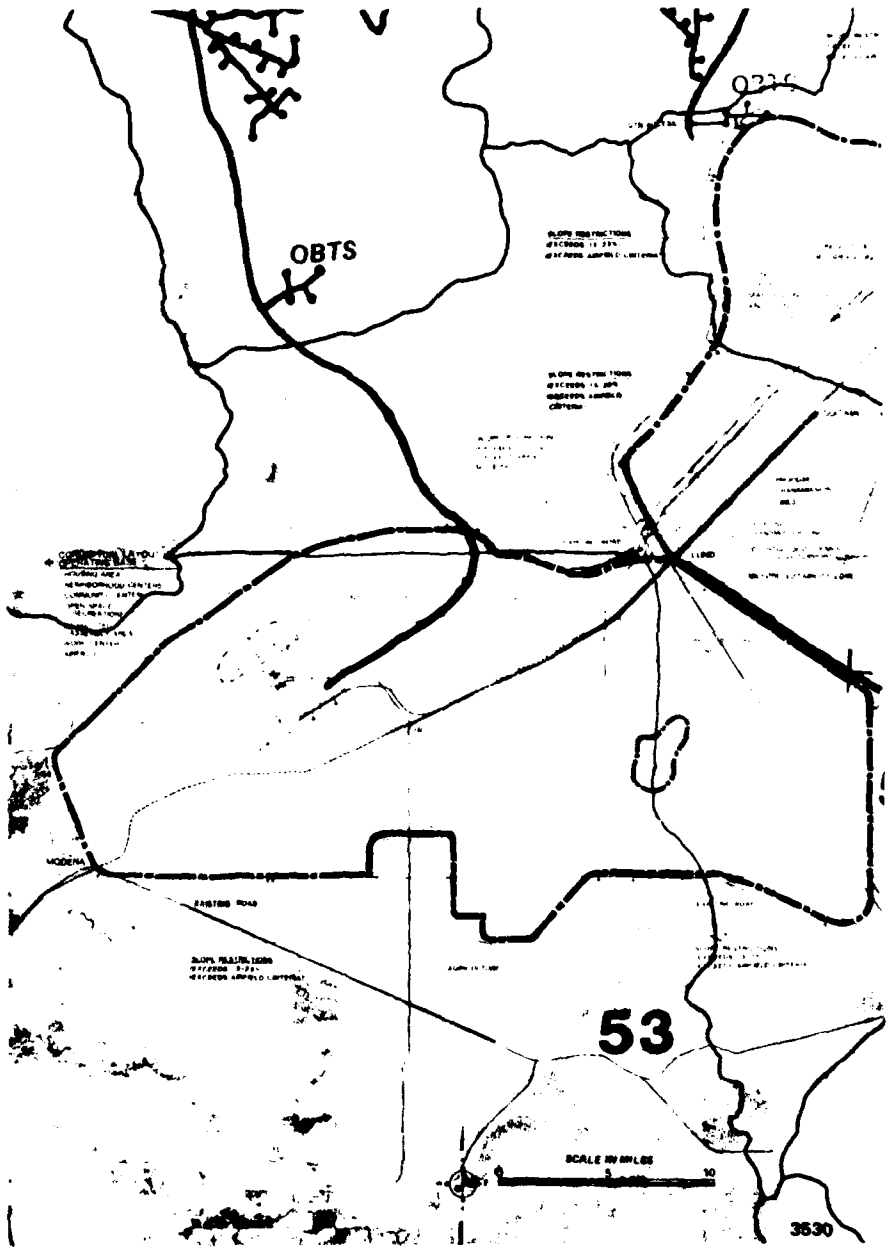


Figure 4.6.1-9. Operating base location suitability zone at Beryl, Utah.

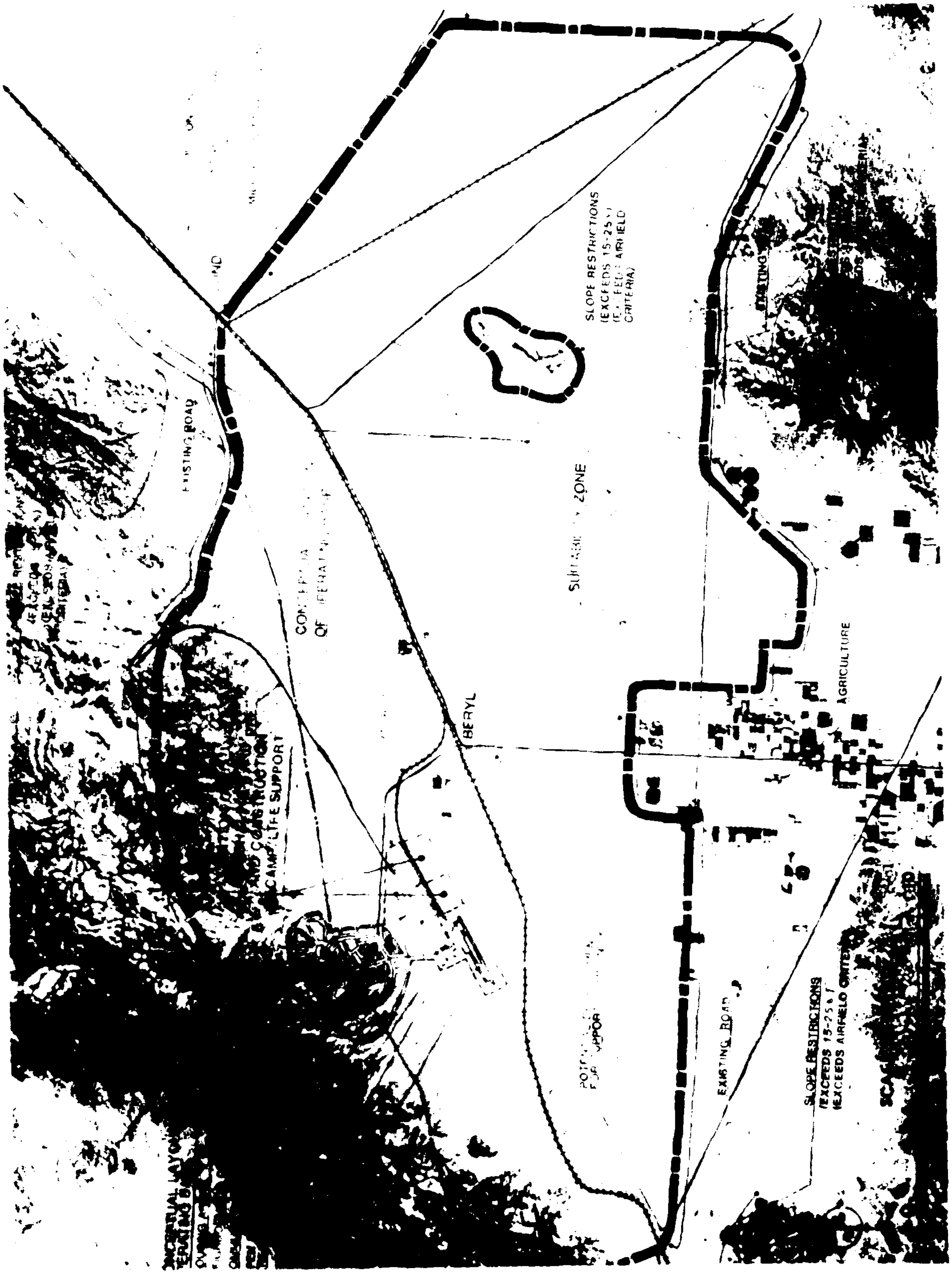


Figure 4.[illegible] Operating base location suitability zone at Beryl, Utah, superimposed on LANDSAT image. See Fig. 2.1-19 of DEIS.

Figure 4.6.1-11 illustrates the suitability zone for either a first or second operating base located in the vicinity of Milford, with a conceptual location of the OB within the suitability zone, and annotates the criteria which determined the boundary along its perimeter. A conceptual layout of the OB with the major components identified is also illustrated as are areas of potential development for an offbase civilian support community. As with the other vicinities, the conceptual location of the OB facilities demonstrates one example of optimum use of the site. Housing is conceptually located to take advantage of south-east slopes and airfield facilities are located in an area which satisfies airfield clearance criteria. Figure 4.6.1-12 illustrates the suitability zone superimposed over a color infrared LANDSAT image, which clearly shows the terrain features, including the agricultural areas around the community of Milford (these appear as dark red).

Delta

Figure 4.6.1-13 graphically illustrates the composite of the siting criteria overlays applied to the base map of the vicinity of Delta, Utah. Hydrologic subunit numbers 46 and 46A form the basic unit of analysis within which the OB suitability zone will be defined. The suitable area which emerges from the analysis is defined to the south by the Sevier Lake, unpatented mining claims, and the DDA. The eastern boundary is defined by Sevier River wetlands, Native American historical sites along the river, and agricultural areas near Delta and Hinckley. The northern boundary is defined by the DDA and land which is unsuitable for development due to heavy water coursing, playa, and desert conditions. The western boundary of the suitable area is defined by the DDA and slope restrictions due to steep terrain. Existing and proposed power transmission lines transit the suitable area. The conceptual OB location avoids these lines; however, the potential conflict of land use has been identified. Should this vicinity be selected for an OB location, and subsequent development of the BCP results in location of the OB in an area which conflicts with the proposed lines, they could be re-located.

Figure 4.6.1-14 illustrates the suitability zone for a second operating base located in the vicinity of Delta. A conceptual location of an OB within the suitability zone is identified and the criteria which determined the boundary of the suitability zone annotated along its perimeter. A conceptual layout of the OB with the major components identified is also illustrated and areas of potential development of an offbase civilian support community are also identified. Again, this conceptual location demonstrates but one example of optimum use of the site and compliance with siting criteria. The housing area is conceptually located at the base of a knoll taking advantage of the slopes and orientation for solar design criteria. Figure 4.6.1-15 illustrates the suitability zone superimposed over a color infrared LANDSAT image, which clearly shows the terrain features. Agricultural areas appear as dark red, and the Sevier Lake area is clearly visible to the south.

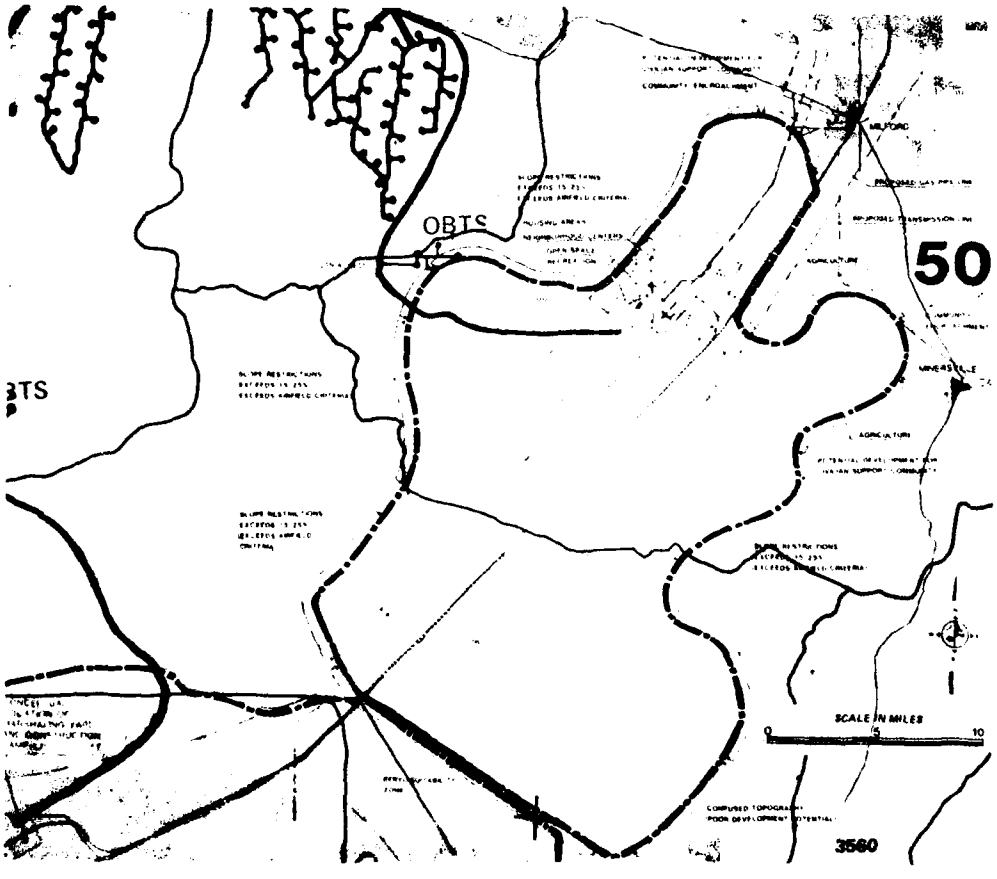


Figure 4.6.1-11. Operating base location suitability zone at Milford, Utah.

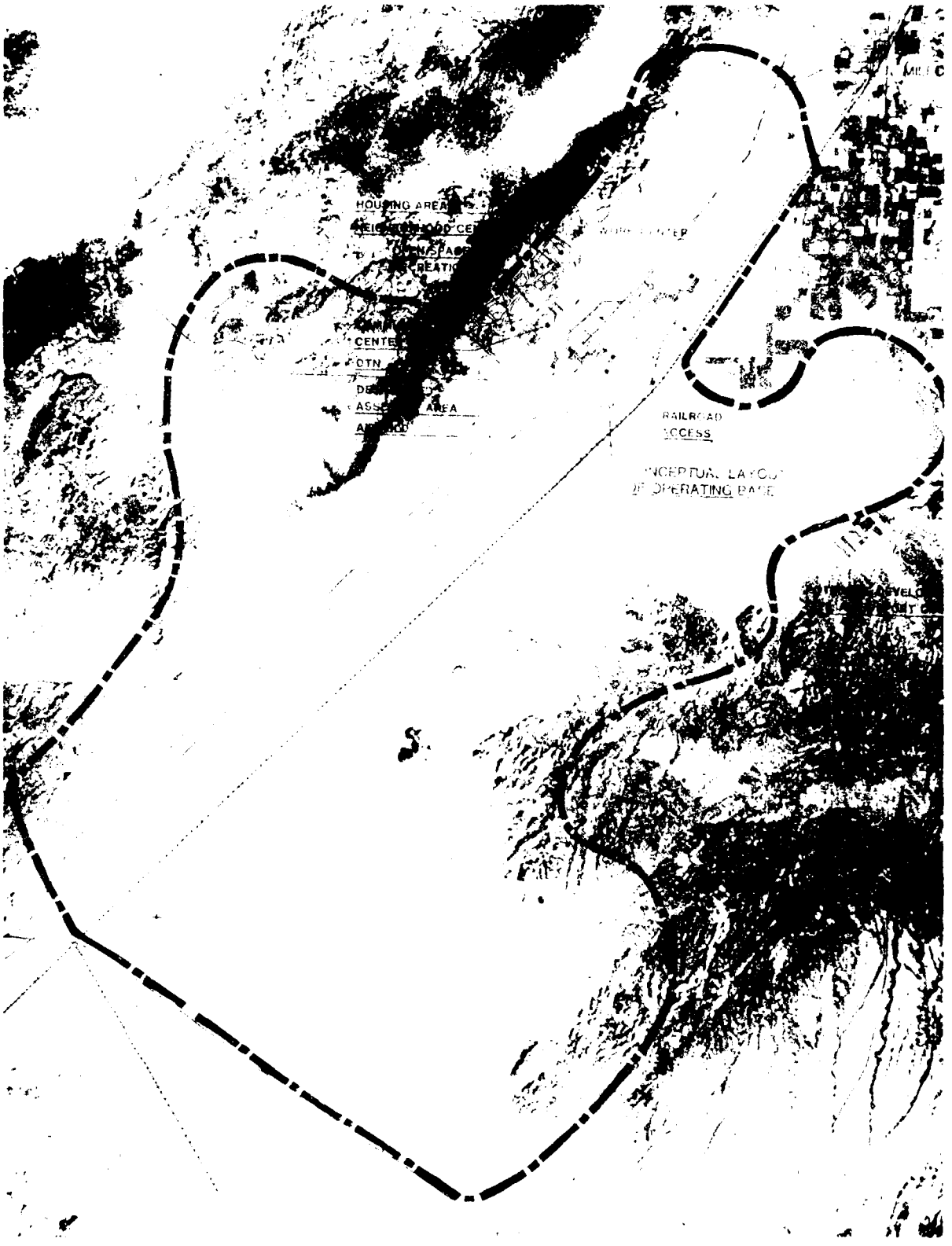


Figure 4.6.1-12. Operating base location suitability zone at Milford, Utah, superimposed on LANDSAT image. See Fig. 2.1-23 of DEIS.

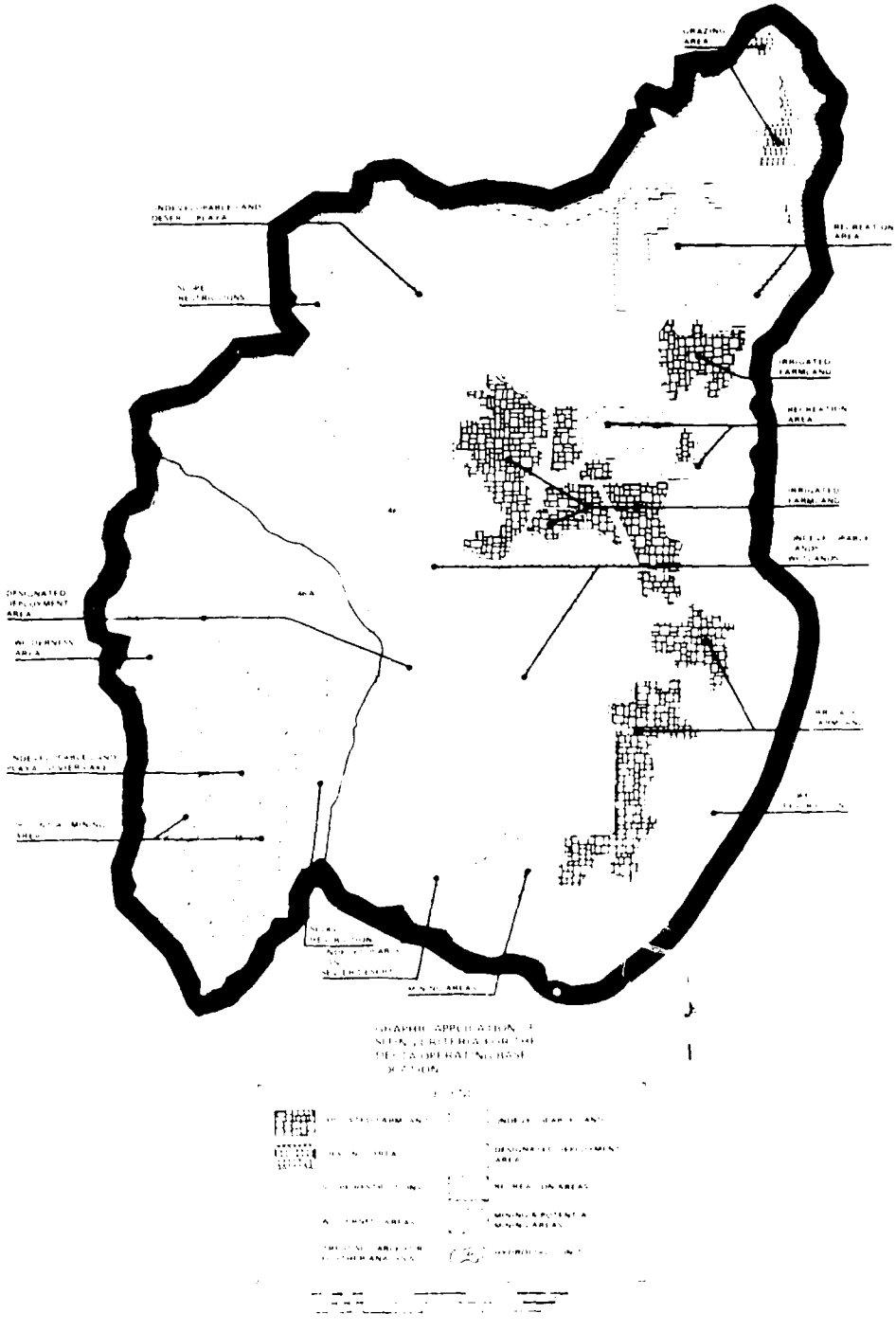


Figure 1-1. Graphic application of siting criteria for the Delta SR location.

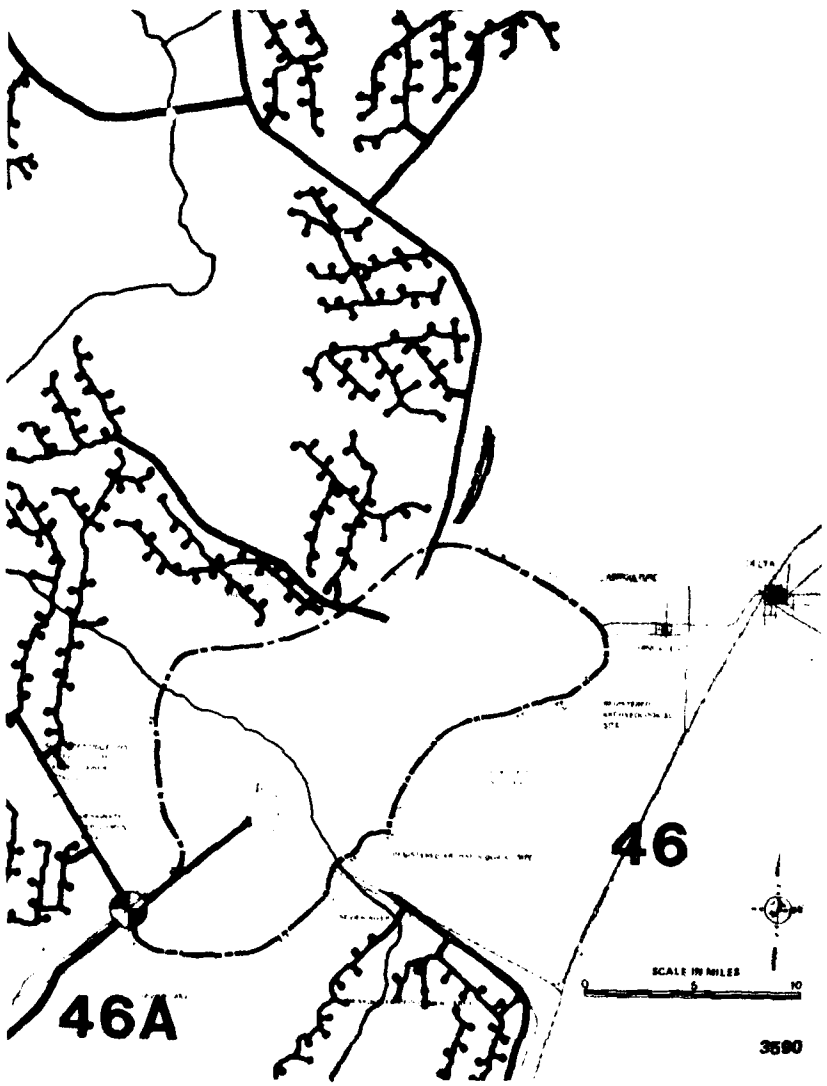


Figure 4.6.1-14. Operating base location suitability zone at Delta, Utah.

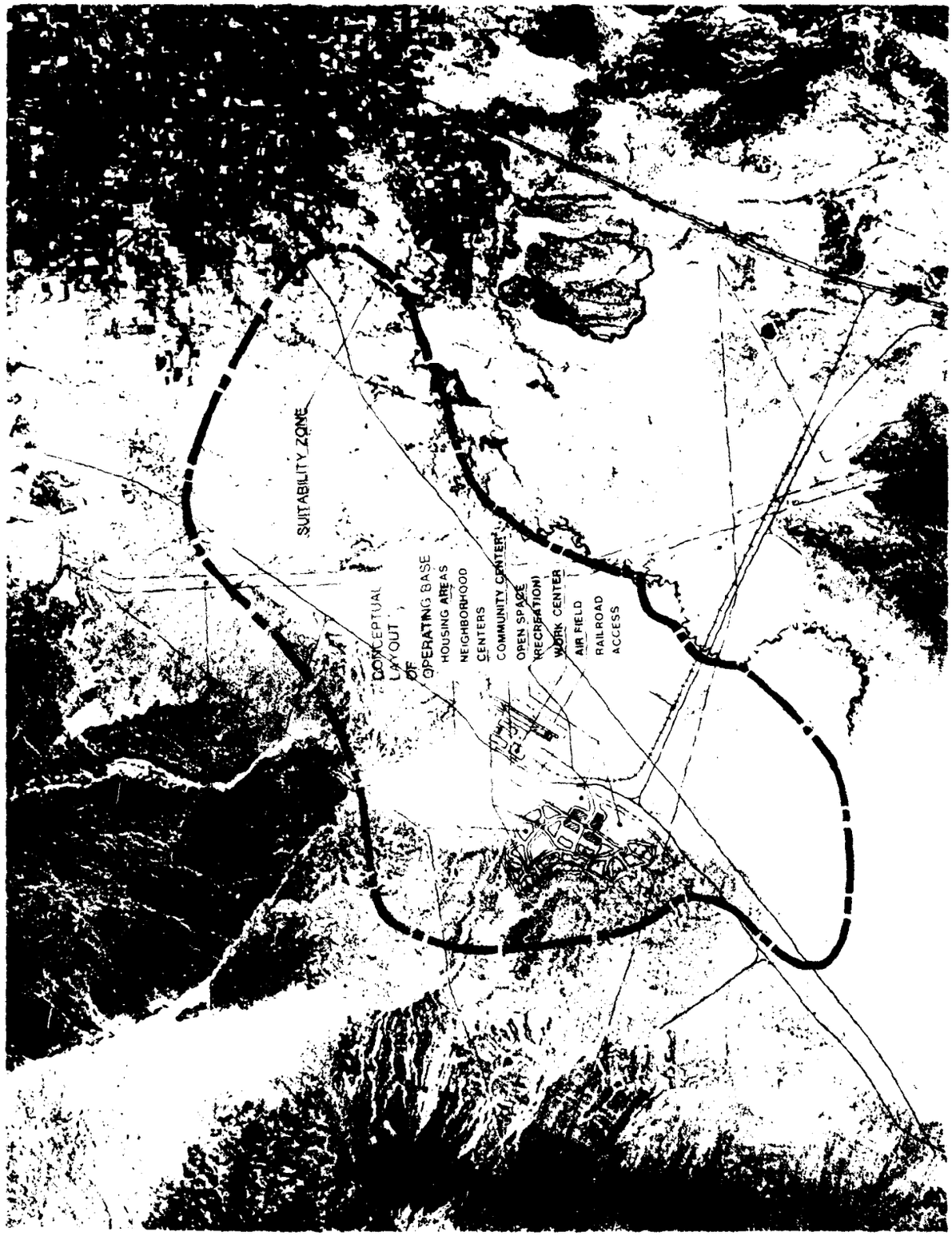


Figure 4.6.1-15. Operating base suitability zone at Delta, Utah, superimposed on LANDSAT image. See Fig. 2.1-21 of DEIS.

Dalhart

Figure 4.6.2-1 graphically illustrates the composite of the siting criteria overlays applied to the base map of the vicinity of Dalhart, Texas. Dallam and Hartley counties form the basic unit of analysis within which the OB suitability zone will be defined. As can be seen, two suitable areas emerge as a result of the analysis. The area nearest the community of Dalhart was identified based on the potential joint-utilization of the municipal airport facilities. Existing airfield facilities, including the runway, would have to be expanded to satisfy airfield criteria. However, there are numerous examples of successful joint-use commercial/military airfield operations which are mutually beneficial. This suitability zone is defined on the northern boundary by an existing highway, railroad, agricultural area, and potential community encroachment. The eastern and southern boundaries are defined by slope restriction due to water coursing in the Rita Blanca Creek; the western boundary by the DDA, and agricultural areas. The southeastern boundary of the second suitability zone is defined by slope restrictions due to the water coursing of the Punta Aqua Creek. The remaining boundary of this suitability zone was defined by the DDA. The Punta Aqua Creek crosses this suitable area but the area to the southwest of the creek could be used for housing or community center activities, as could the area north of the highway/railroad.

Figure 4.6.2-2 illustrates the suitability zones for a second operating base located in the vicinity of Dalhart, with a conceptual location of an OB within one of the zones, and annotates the criteria which determined the boundary along its perimeter. A conceptual layout of the OB with the major components identified is also illustrated and areas of potential development for an offbase civilian support community identified. The airfield is conceptually located to satisfy airfield criteria and avoidance of conflicts with airfield accident potential zones. Recommended facility orientation and siting would be determined in the Tier 2 development of the BCP.

Figure 4.6.2-3 illustrates the suitability zones superimposed over a color infrared LANDSAT image which clearly shows the relatively flat terrain features, the water courses, and agricultural areas.

Clovis

Figure 4.6.2-4 graphically illustrates the composite of the siting criteria applied to Cannon Air Force Base on the base map of the vicinity of Clovis, New Mexico. Curry County is the basic unit of analysis within which the OB suitability zone will be defined. The suitable area which emerges as a result of the analysis is much smaller than those defined in the other OB community vicinities. This is because the existing

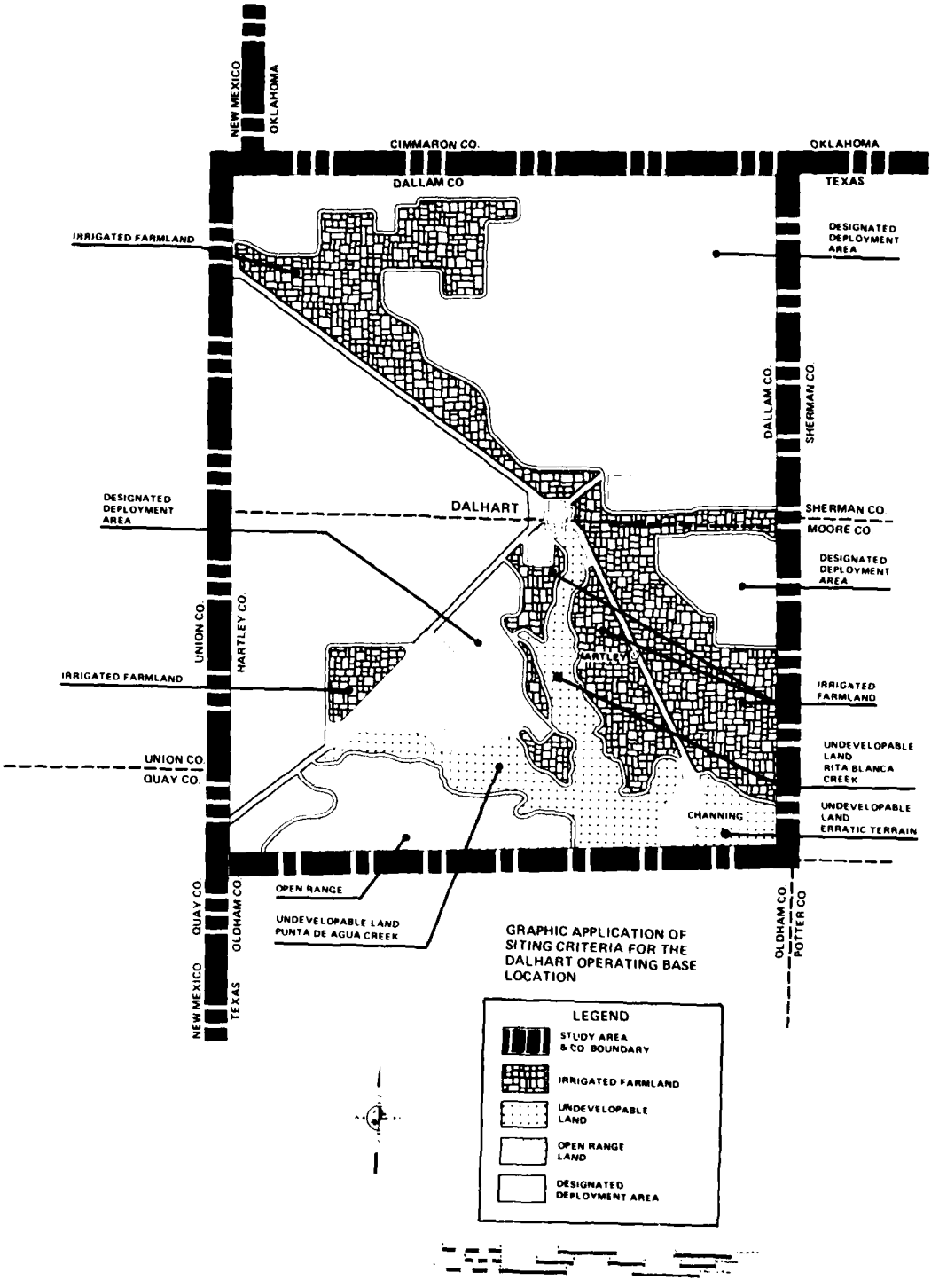


Figure 4.6.2-1. Graphic application of siting criteria for the Dalhart OB location.

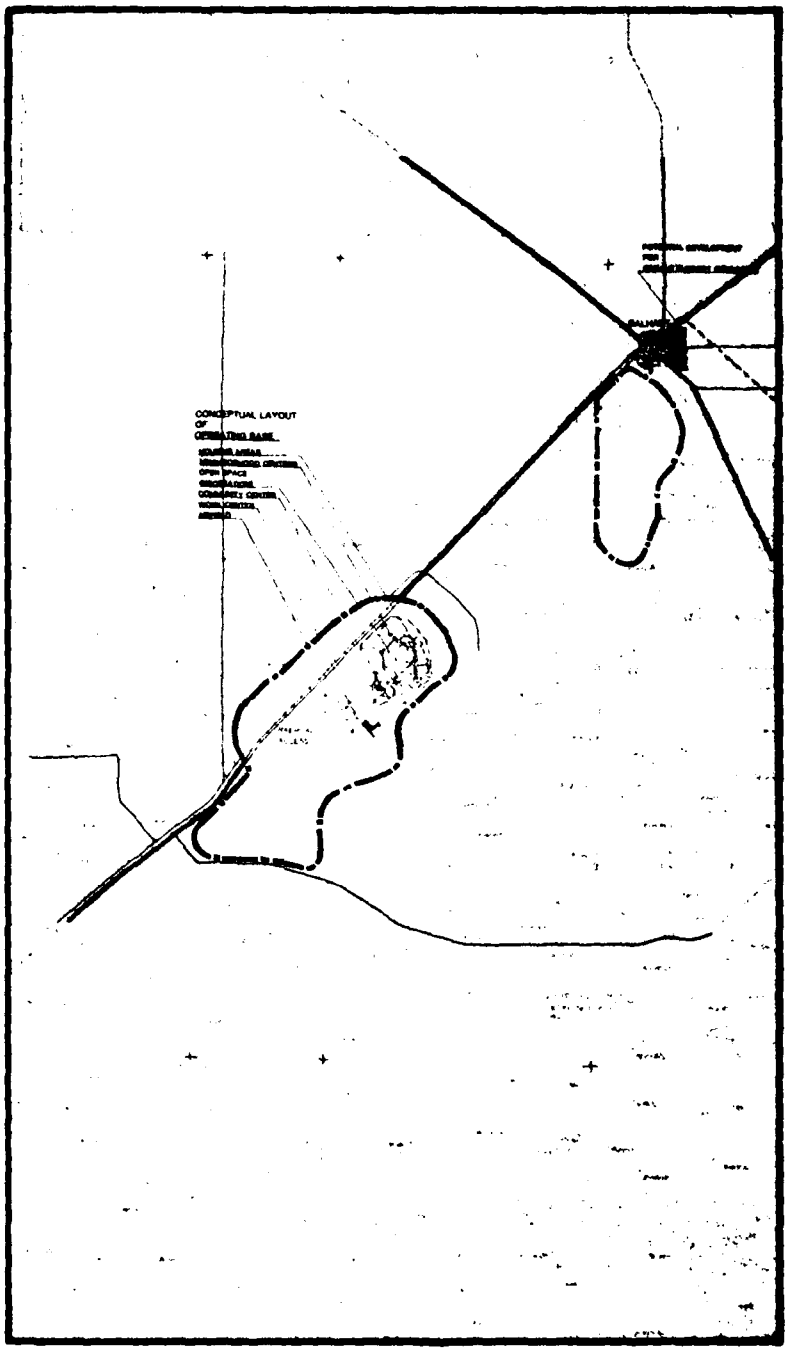


Figure 4.6.2-2. Operating base location suitability zones in the vicinity of Dalhart, Texas.

Figure 4.6.2-3. Operating base location suitability zones in the vicinity of Dalhart, Texas, superimposed on LANDSAT image. See Fig. 2.1-25 of DEIS.

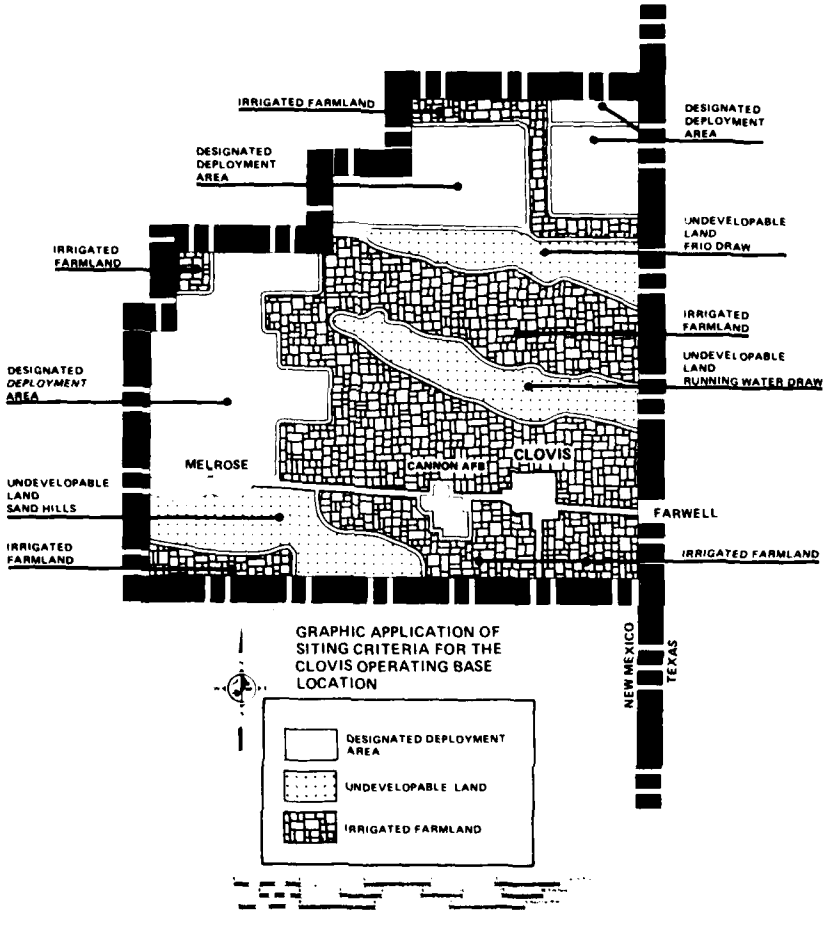


Figure 4.6.2-4. Graphic application of siting criteria for the Clovis, New Mexico (Cannon AFB) OB location.

Cannon AFB facilities would be used to the maximum extent possible and the existing runway facilities expanded to satisfy the siting criteria. Existing and proposed extensions to airfield accident potential zones limit development off the ends of the runways. Existing airfield facilities and associated controlled areas restrict access between existing facilities and OB development to the east of the present base boundary. Additionally, the existing weapons storage area and sewage treatment plant are located on the east boundary of Cannon AFB. Location of the DTN to the west of Cannon AFB and the existing operational facilities encourage OB expansion and siting of the DAA to that side of the base. An existing Air Force housing area is located north of the highway which encourages continued development in that area. The land use in the region is primarily agricultural and a compact OB development based on expansion and maximum use of existing facilities will limit disruption of the agricultural areas.

Figure 4.6.2-5 illustrates the suitability zone for either a first or second operating base located in the vicinity of Clovis, New Mexico, a conceptual expansion of Cannon AFB, and annotates the criteria which determined the boundary along its perimeter. Also illustrated within the conceptual expansion areas are the major elements of the OB which could be located in those areas. The detailed proposals resulting from development of the BCP will identify how expansion of existing facilities and location of new facilities would best use the site. Figure 4.6.2-6 illustrates the suitability zone superimposed over a color infrared LANDSAT image which clearly shows the agricultural areas. (Dark red areas are irrigated crops.)

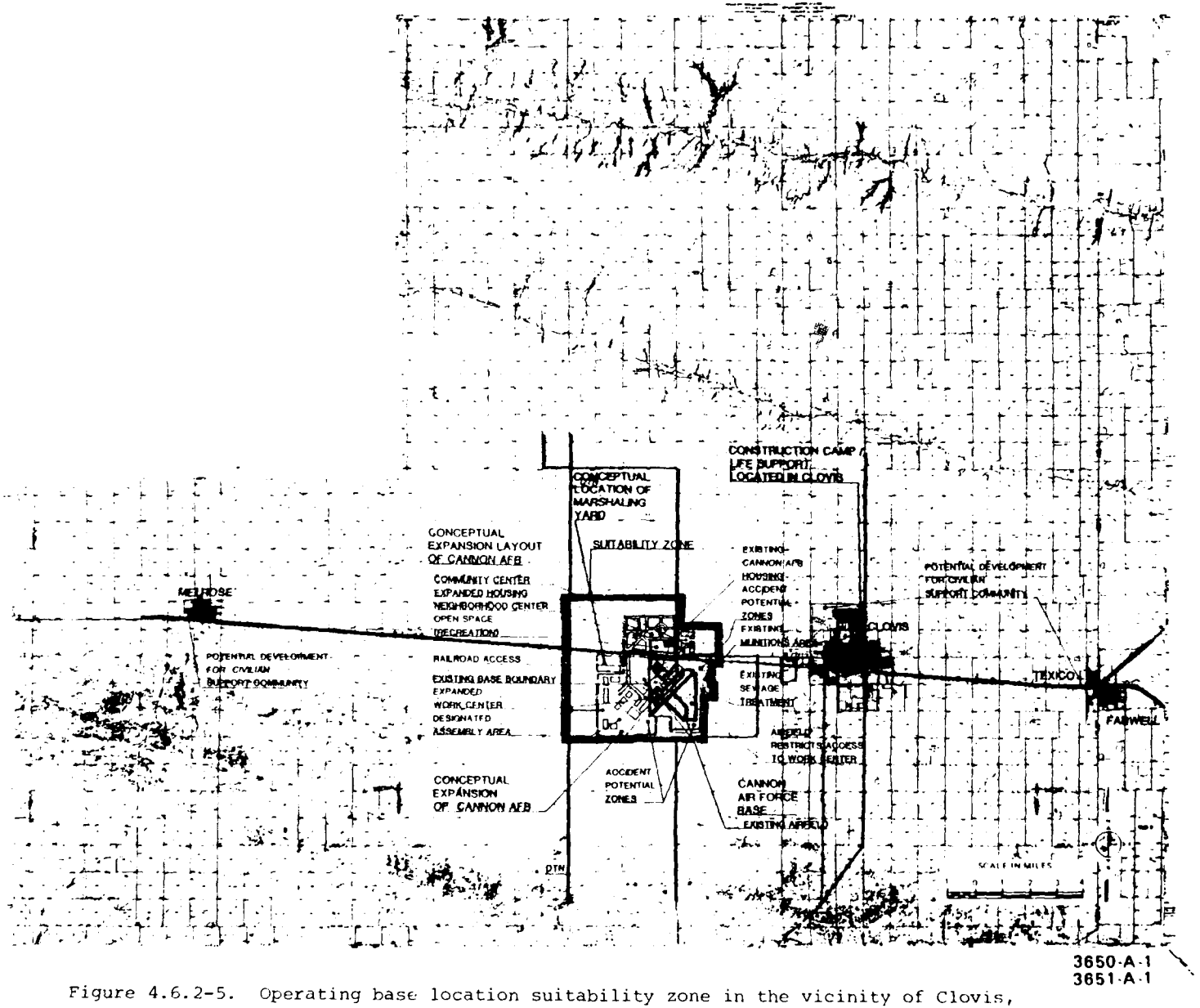


Figure 4.6.2-5. Operating base location suitability zone in the vicinity of Clovis, New Mexico.

Figure 4.6.2-n. Operating base location suitability zone in the vicinity of Clovis, New Mexico, superimposed on LANDSAT image. See Fig. 2.1-27 of DEIS.

5.0 RATIONALE FOR SELECTION OF OPERATING BASES WITH DESIGNATED ASSEMBLY AREAS (DAA)

Two operating bases are required to support the M-X system. If the full deployment of 200 missiles is to be made in one region (e.g., Nevada/Utah or Texas/New Mexico), one of the operating bases will have a designated assembly area (DAA).

A DAA is a fenced area, approximately 1,950 acres in size, in which missile and vehicle components are assembled after they are received from various manufacturers located throughout the country. The assembly process is designed to be relatively slow and capable of being monitored by national technical means (satellite) for compliance with arms control agreements. Deployed missiles requiring major maintenance or replacements are returned to the DAA. It is, therefore, desirable to have only one DAA in any region to enhance confidence of parties to arms control agreements that suspicious or surreptitious assembly and deployment of missiles does not occur.

If a decision is made to deploy a portion of the M-X system in Nevada/Utah and the remainder of Texas/New Mexico, each of two regions will have an operating base with a DAA.

Extra demands are made on an operating base (OB) with a DAA. The OB/DAA requires about 1,950 acres more land, about 1,800 additional employees, additional arms control monitoring capability, and more stringent logistical support requirements compared to an operating base without a DAA. Of the two required bases, the first to be constructed will have the DAA in order to meet the system initial operational capability date (when 10 missiles and associated facilities are fielded) in mid-1986.

5.1 CRITERIA FOR DAA SELECTION

Criteria, shown in Table 5.1-1, were established to determine which of the alternative operating bases are suitable to have a DAA. Each of the criteria is described below:

Resource Availability

The DAA requires approximately 1,950 fenced acres for the missile assembly, launcher integration, vehicle and storage facilities. This land requirement is in addition to the 5,000 - 5,500 acres needed for other portions of the operating base complex.

Table 5.1-1. Criteria for selection of operating bases capable of having a Designated Assembly Area.

CATEGORY	DEFINITION
Resource Availability	• 1,950 acres required for DAA • Approximately 7,000 acre-ft/yr of water
Arms Control	• OB/DAA shall be located external to the deployment area by at least 90 minutes, approximately 30 mi • Avoid sites having large buildings in vicinity • Locate the OB/DAA in area with best cloud-free line of sight
Physical Security	• Minimize travel through deployment area • Site near deployment area to improve security response consistent with arms control (not closer than 30 mi)
Operations/Maintenance	• Locate DAA near centroid of deployment area consistent with arms control (desire less than 8 hours travel time) • The designated transportation network road shall not exceed 7 percent grade • Climate conducive to minimum restrictions for flying and M-X system operation
Logistics	• Compliance with AFM 86-8 criteria for 12,000 ft runway operations • Air installation compatible use zones (AICUZ) • Proximity to main line railroad (133-136 lb/yd rail) • Accessibility to roads • Suitability for construction staging
Socioeconomics	• Proximity to established economic base • Avoid interference with high potential economic resource areas

The water requirement for an OB is approximately 5,000 acre-ft per year to support about 13,000 people (5,700 employees plus dependents and induced population). In order to support an OB with DAA the water requirement is approximately 7,000 acre-ft per year to support 17,000 people (7,500 direct workers plus dependents and induced population).

Arms Control

To facilitate arms control monitoring, the OB/DAA should be located external to the deployment area by at least 90 minutes special transport vehicle (STV) travel time on the Designated Transportation Network (DTN) road. If the STV average speed is assumed to be 20 mi/hr the desired separation distance from the DAA to the deployment area is approximately 30 mi.

In selecting the DAA site the USAF avoided locations having potential external connectivity to the DTN. For example, those sites having large buildings capable of surreptitious assembly of missiles in violation of arms control agreements.

The OB with the DAA is to be located in the site having the highest probability of cloud-free line of sight to permit the highest confidence of missile/launcher production verification by satellite.

Physical Security

The OB with the DAA should be sited to minimize travel through the deployment area by off-duty base personnel and logistic support requirements. This reduces activity within the DDA, reduces numbers of false alarms, and improves security by being able to detect and react to suspicious activities more readily. Security response is improved by reducing the distance to the deployment area from the operating base complex. However, as previously discussed, the OB/DAA should not be closer than 30 mi from the deployment area consistent with arms control goals. A measure of how effective an OB/DAA can be as far as security response is concerned is the number of clusters located within 65 air mi, which corresponds to a 30 min helicopter response.

Operations/Maintenance

The DAA should be located as close to the centroid of the deployment area (consistent with arms control) as possible to reduce the length of DTN road, minimize travel times/fuel consumption for missile transport via STV, minimize personnel requirements, reduce system cost, and maintain the best operational readiness rate. Each of the 200 missiles proposed to be deployed must be transported from the DAA to its assigned cluster. Conversely, whenever the missile requires major maintenance or replacement it must be returned to the DAA. Minimum distance from DAA to deployment area contributes to efficient system operation at the lowest cost.

A driving time of approximately 8 hours or less is desirable from DAA to the centroid of the DDA. The farther away the potential DAA is from the centroid, the less suitable it becomes.

The road which goes between the DAA and the designated deployment area shall not exceed 7 percent grade. This criterion is dictated by construction cost/schedule, fuel consumption, vehicle design, and the risk involved in achieving the required initial operational capability date.

Another desirable characteristic of the OB/DAA location is that it have moderate climate to provide a pleasant living environment, minimum restrictions for flying, and year-round safe M-X system operation/ maintenance activities.

Logistics

Due to the heavy logistical demand placed on an OB/DAA it is important that it meet criteria associated with airfields, railroads, and roads. First, provisions must be made for a 12,000 ft runway and airfield operations which comply with AFM 86-8 criteria. This includes the Air Installation Compatible Use Zones (AICUZ) considerations of noise impacts onbase and/or local community development, and avoidance of aircraft accident potential zones. Regarding railroads, the operating base with the DAA shall be located as close as possible to a railroad having main line rail loading e.g., 133-136 lb/yd rail. Operating bases also require public road access for logistics support, personnel travel, and access to surrounding cities and recreational areas.

Another important logistics consideration is the suitability of the DAA for construction staging. The desirable features include proximity to labor market, life support for construction workers, and construction materials.

Socioeconomics

Proximity of the OB/DAA to an established economic base is important because it minimizes negative impacts of the following:

- Relative population increases, density changes, or disruption of the local social fabric
- Relative effect of adding public services and associated financing
- Impact of temporary workforce
- Unemployment effects (which may result from those who change present jobs to gain M-X-related jobs)

Being close to an established economic base is important for logistics reasons as well as to maintain high morale and personnel retention rates. As a rough rule of thumb, it would be desirable to be within 110 mi (2/hrs driving time) of a major city with an established economic base and infrastructure that would be least impacted by M-X.

The last criterion addressed in Table 5.1-1 is that the OB/DAA should avoid interference with high potential economic resource areas. Some of the examples include oil and gas fields, strippable coal, oil shale, uranium deposits, known geothermal resource areas, and existing or proposed/approved power plants.

5.2 APPLICATION OF CRITERIA

The DAA criteria identified in Table 5.1-1 and described in the same section (5.1) were applied to each of the seven alternating operating base locations identified as a result of analysis in Section 4. These locations include:

- Coyote Spring Valley, Nevada
- Ely, Nevada
- Beryl, Utah
- Delta, Utah
- Milford, Utah
- Clovis, New Mexico
- Dalhart, Texas

Four of the alternative operating base locations are considered suitable to have a DAA. They are Coyote Spring Valley, Nevada; Beryl and Milford, Utah; and Clovis, New Mexico. The remaining three alternative locations (Ely, Nevada; Delta, Utah; and Dalhart, Texas) either violate operational criteria or have a combination of drawbacks which disqualify the sites as DAA locations.

The reasons why three of the alternative operating base locations were considered unsuitable as designated assembly areas are summarized below:

Ely, Nevada. Ely's location would require operations and logistics traffic to pass through the DDA in order to reach major cities such as Las Vegas and Reno, Nevada or Salt Lake City, Utah. Increased numbers of people and vehicles to be monitored are undesirable from the standpoint of physical security. With regard to arms control

monitoring, Ely has the least desirable cloud cover characteristics of all alternative OB locations in the Nevada/Utah region. Only 38 percent of the time does Ely have relatively cloud-free (30 percent or less) weather. During the winter months there is about 45 inches of snowfall, minimum temperatures are below 10°F and wind speeds exceed 17 knots approximately 10 percent of the time. Harsh winter climate could degrade operations even if only on a temporary basis. An airfield at Ely would require the most waivers to AFM 86-8 for both the approach and departure corridors; additionally, the high elevation decreases aircraft payload capacity.

Another major drawback is poor accessibility to major highways and remoteness from established economic bases which have the labor pools, goods and services, and capacity to help absorb a rapid influx of population during the construction period. Ely is 120 mi from an interstate highway, about 250 mi from Salt Lake City, Utah and about 270 mi from Las Vegas, Nevada.

Construction staging may be difficult from Ely for several reasons. The existing Nevada Northern railroad is not capable of carrying M-X loads. Refurbishment is estimated to cost approximately $50M and would have to occur soon enough to support initial constuction activities in 1982. Another detracting factor is the distance from a marshalling yard/DAA at Ely to the likely first valleys in which construction takes place (in the heart of the deployment area) would increase the risk of achieving the required initial operational capability date.

A designated assembly area in addition to the operating base and the White Pine Power Project would compound the demand for resources such as labor, water, etc. This would place a greater strain on the community infrastructure which will be difficult to accommodate.

In summary, Ely was not considered suitable as a DAA because (1) its location induces traffic into the Designated Deployment Area and complicates physical security; (2) its weather does not facilitate arms control monitoring or year-round operations (particularly winter); (3) airfield restrictions and decreased payload capability due to high elevation; (4) poor accessibility from interstate highways; (5) remoteness from existing economic bases; (6) distance to IOC valleys; (7) increased demand for resources in competition with White Pine Power Project.

Delta, Utah. The Delta operating base suitability zone violates the DAA arms control isolation criteria. It is not external to the deployment area and has clusters located only about 2 mi away (as compared to the 90 min, 30 mi criteria previously described). The long distance to the centroid of the deployment area does not facilitate DAA support of the system for initial emplacement of missiles or for sustained operations. Increased water demand of a DAA is a matter of

concern in an area wherein the existing ground water use exceeds the perennial yield.

Dalhart, Texas. Dalhart, similar to Delta, Utah, fails to meet the DAA criteria for arms control standoff distances. The Dalhart suitability zone is not external to the designated deployment area and the closest cluster is approximately 6 mi away, much less than the desired separation distance of 30 mi.

6.0 RATIONALE FOR ALTERNATIVE OPERATING BASE COMBINATIONS

Deployment of M-X will include the designated deployment area (DDA) or areas and the operating base (OB) complexes. Previous sections have shown that there are two suitable regions in which the system could be deployed (Nevada/Utah and Texas/New Mexico) and seven alternative OBs from which to determine the best combination. This section addresses how various alternatives were selected for analysis.

There are only three general options available to the decision-maker if he decides to deploy the M-X system. They are:

1. Full deployment in Nevada/Utah

2. Full deployment in Texas/New Mexico

3. Split basing.

Each of these options is addressed separately in the following sections.

6.1 FULL DEPLOYMENT IN NEVADA/UTAH

Five alternative operating base locations have been identified in the Nevada/Utah region. They are Coyote Spring Valley, Nevada; Milford, Utah; Beryl, Utah; Delta, Utah; and Ely, Nevada. Of the five, only two are required to support the designated deployment area suitability zones (identified in Section 3.4).

A set of criteria shown in Table 6.1-1 was developed to select alternative pairs of operating bases for further analysis. Rationale for each of the criteria is as follows:

Two operating bases (Criterion 1). In October 1979, Headquarters USAF directed the Strategic Air Command to study the cost and implications of using one, two, three, or four support bases to support the M-X system. The study concluded the following:

1. Bases should be located as near as possible to large cities.

2. Two bases in separate states, are preferred to minimize the major impact to a single location.

3. Two bases significantly improve the operational span of control at only slightly higher costs.

4. Three or four bases significantly increase system costs, create isolated base areas, and are therefore less desirable than fewer bases.

Table 6.1-1. Criteria for alternative operating base combination (full basing).

1. Two bases are required.
2. Operating bases must be in the same states where missiles are deployed.
3. Both bases must not be in the same state.
4. The first operating base must be suitable for a Designated Assembly Area (DAA)
5. First operating base must have close proximity to candidate IOC valleys.

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As a result of these conclusions, Headquarters SAC recommended, and the M-X Environmental Council approved, the use of two M-X operating bases.

Operating bases in the same states as deployed missiles (Criterion 2). This is intended to keep the system efficient as well as meet operational requirements. Locating the OB in the same state as the missiles keeps the system compact, contributes to a higher operational readiness, and reduces system cost. Additionally, keeping the operating base and deployment areas in the same states allows any adverse impacts to be offset by benefits within the same region.

Both bases must not be in the same state (Criterion 3). In order to mitigate the impact of a rapid influx of people associated with M-X, the Air Force has decided to deploy M-X facilities in at least two states. Furthermore, no more than one operating base will be deployed in the same state. This distribution reduces the potential impacts on any given area.

The first operating base must be suitable as a designated assembly area (Criterion 4). For timely achievement of the required Initial Operational Capability date, the first operating base must have a designated assembly area (DAA). The DAA is needed for assembly, checkout, and repair of missile components.

The criteria described above were applied to the possible combinations of operating bases in the Nevada/Utah region and the results are shown in Table 6.1-2.

The first operating base must have close proximity to IOC valleys (Criterion 5). For timely achievement of the required IOC date, the first operating base must support the system with its DDA.

6.2 FULL DEPLOYMENT IN TEXAS/NEW MEXICO

If the entire M-X system were to be deployed in the Texas/New Mexico region, two suitable operating base locations were identified: Clovis, New Mexico; and Dalhart, Texas. Application of the same criteria shown in Table 6.2-1 identified one reasonable alternative for further analysis (see Table 6.2-1).

6.3 SPLIT BASING

Split basing is an option wherein approximately one half of the system (one operating base, 100 missiles, and 2,300 shelters) would be deployed in the Nevada/Utah region and the other half of the system would be in Texas/New Mexico. The intent of split basing is to provide an alternative with lower potential impacts than full deployment of the entire system in a single region.

Table 6.1-2. Evaluation of operating base combinations.

OB #1	OB #2	EVALUATION FOR FURTHER ANALYSIS OR ELIMINATION
Coyote Spring Valley	Milford	Retain for Analysis
	Beryl	Retain for Analysis
	Delta	Retain for Analysis
	Ely	Reject (3)
Milford, UT	Coyote Spring	Retain for Analysis
	Beryl	Reject (3)
	Delta	Reject (3)
	Ely	Retain for Analysis
Beryl, UT	Coyote Spring	Retain for Analysis
	Milford	Reject (3)
	Delta	Reject (3)
Delta, UT	Coyote Spring	Reject (5)
	Milford	Reject (3) (5)
	Beryl	Reject (3) (5)
	Ely	Reject (3) (5)
Ely, NV	Coyote Spring	Reject (3) (5)
	Milford	Reject (5)
	Beryl	Reject (5)
	Delta	Reject (5)

Note: Criteria for elimination shown in parenthesis

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Table 6.2-1. Operating base combination evaluation (full basing Texas/New Mexico).

OPERATING BASE NO. 1	OPERATING BASE NO. 2	RESULT*
Clovis, NM	Dalhart, TX	Retain for analysis
Dalhart, TX	Clovis, NM	Reject (5)

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*Rejected because Dalhart is not considered suitable as a Designated Assembly Area (Reference Table 6.1-1, criterion 4).

For split basing, two additional criteria were developed for the selection of alternative operating base combinations. Those are shown as criteria numbers 5 and 6 of Table 6.3-1.

The suitable deployment zones for split basing will permit approximately 70 missile clusters in Nevada, 30 in Utah, 65 in New Mexico, and 35 in Texas. The split basing conceptual deployment layout in Nevada/Utah was derived by halving the number of missile clusters included in the full basing option, thus providing equal mitigation to each state. The split basing conceptual layout in Texas/New Mexico minimized potential impacts by avoiding inhabited buildings and irrigated croplands to the maximum extent feasible.

Criterion number 6 of Table 6.3-1 states that "Each of the two regions will have an OB/DAA." This is due to the fact that the two regions of Nevada/Utah and Texas/New Mexico are widely dispersed, and the facilities in each area must be virtually duplicated to meet operational and logistic requirements.

Application of criteria 5 and 6 of Table 6.3-1 indicates that Coyote Spring Valley, Nevada and Clovis, New Mexico should be analyzed further as a split basing alternative (see Table 6.3-2). This conclusion was derived as follows. In Nevada/Utah, the OB/DAA should be located in Nevada, because the majority of missile shelters would be deployed there (70 in Nevada as opposed to 30 for Utah). Of the two suitable operating base zones in Nevada, only Coyote Spring Valley is suitable as an OB/DAA. Regarding Texas/New Mexico, the majority of the missile clusters would be located in New Mexico (65 compared to 35 for Texas). Therefore, the OB/DAA should be at the Clovis suitability zone, the only one in New Mexico.

The M-X-related environmental impacts within one split basing region (e.g., Nevada/Utah) are not significantly affected by M-X activities in the other region (e.g., Texas/New Mexico). Therefore, once the number of missiles and shelters in each of the regions is determined, the most important variable influencing the magnitude and phasing of environmental impacts is the project schedule. The Basing Area Analysis Report, addressed in Section 2.2, indicated military and operational preferences for M-X deployment in the Nevada/Utah area. Therefore, when consideration was given to split basing, an alternative was developed wherein the first portion of the system would be deployed in the preferred area of Nevada/Utah rather than start in Texas/New Mexico. Environmental impacts of combination 33, Clovis, New Mexico and Coyote Spring Valley, Nevada, are considered to be essentially equivalent to those in combination 23 which is retained for further analysis.

Table 6.3-1. Criteria for alternative operating base combinations.

1. Two operating bases are required.
2. Operating bases must be the same state where the missiles are deployed.
3. Both bases must not be in the same state.
4. The first operating base must be suitable as a designated assembly area.
5. The first operating base must have close proximity to IOC valleys or construction zones.
6. Only one OB with DAA will be located in each region. OB/DAA will be located in the state having the majority of shelters deployed.
7. Each of the two regions will have an OB/DAA.

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Table 6.3-2. Operating Base combination evaluation (split basing)

COMBINATION	OPERATING BASE NO. 1	OPERATING BASE NO. 2	RESULT*
23*	Coyote Spring Valley, Nevada	Clovis, New Mexico	Retain
24	Coyote Spring Valley, Nevada	Dalhart, Texas	Reject 6, 5
25	Milford, Utah	Clovis, New Mexico	Reject 5
26	Milford, Utah	Dalhart, Texas	Reject 6, 5
27	Beryl, Utah	Clovis, New Mexico	Reject 5
28	Beryl, Utah	Dalhart, Texas	Reject 5, 6
29	Delta, Utah	Clovis, New Mexico	Reject 4, 5, 6
30	Delta, Utah	Dalhart, Texas	Reject 4, 5, 6
31	Ely, Nevada	Clovis, New Mexico	Reject 4, 6
32	Ely, Nevada	Dalhart, Texas	Reject 4, 5, 6
33	Clovis, New Mexico	Coyote Spring Valley, Nevada	Same as Comb. 23
34	Clovis, New Mexico	Milford, Utah	Reject 5
35	Clovis, New Mexico	Beryl, Utah	Reject 5
36	Clovis, New Mexico	Delta, Utah	Reject 5, 6
37	Clovis, New Mexico	Ely, Nevada	Reject 6
38	Dalhart, Texas	Coyote Spring Valley Nevada	Reject 4, 5, 6
39	Dalhart, Texas	Milford, Utah	Reject 4, 5, 6
40	Dalhart, Texas	Beryl, Utah	Reject 4, 5, 6
41	Dalhart, Texas	Delta, Utah	Reject 4, 5, 6
42	Delhart, Texas	Ely, Nevada	Reject 4, 5, 6

* Retain for further analysis.

** Rejection criterion or criteria numbers are shown in parentheses. Reference Table 6.3-1.

6.4 ALTERNATIVES FOR FURTHER ANALYSIS

Application of criteria to potential operating base combinations has identified nine alternatives shown in Table 6.4-1.

6.5 PROPOSED ACTION

The purpose of this section is to document considerations underlying the preference for two of the previously identified operating base suitability zones in Nevada and Utah. Attention is focused on the Nevada/Utah region, because all information collected to date indicates that region is preferred for deployment of M-X in MPS. Section 2.2 contains rationale for that conclusion.

A final decision on base locations will not be made until 30 days after the final EIS has been filed with EPA. Nevertheless, the Council on Environmental Quality regulations require that the proponent of the action identify a preferred alternative if one exists. Identifying a preferred alternative serves to sharply define issues and provides a clear basis for comparisons of alternatives in the Draft EIS and during the subsequent public comment period of a preferred alternative does not influence program development or limit alternatives examined in the NEPA process.

Criteria for the identification of a preferred alternative evolved from operational requirements, arms control considerations, concerns for the biophysical environment, and relationships to the social and economic structures of the region. These criteria were applied to each of the five suitability zones including Coyote Spring Valley and Ely in Nevada as well as Beryl, Milford, and Delta, in Utah. Consideration was also given to mitigation of adverse impact before a judgment was made on the preferred alternative. Table 6.5-1 illustrates evaluation of criteria and base combinations.

OPERATIONAL CRITERIA (6.5.1)

Air Force preferences are influenced by several factors relating to the effectiveness of base operations, ease of initial construction, and logistic support of the base.

Air Field Operations (6.5.1.1)

Suitable base sites were assessed for their ability to support normal aircraft operations in compliance with AFM 86-8, Airfield and Airspace Criteria and applicable Federal Aviation Agency regulations governing civil airfield operations. Each of the five potential base locations would require waivers of specific provisions of AFM 86-8 primarily because of elevated terrain features in the surrounding airspace. (Such waivers have been granted for currently active Air Force bases.) Preliminary discussions with Air Force Inspection Safety Center personnel indicate that waivers can be obtained as long as a high degree of safety can be ensured.

Table 6.4-1. Summary of alternatives retained for further analysis.

ALTERNATIVES FOR FURTHER ANALYSIS	OPERATING BASE NO. 1	OPERATING BASE NO. 2
Full Deployment		
Nevada/Utah	Coyote Spring Valley, NV	Milford, UT
Nevada/Utah	Coyote Spring Valley, NV	Beryl, UT
Nevada/Utah	Coyote Spring Valley, NV	Delta, UT
Nevada/Utah	Beryl, UT	Ely, NV
Nevada/Utah	Beryl, UT	Coyote Spring Valley, NV
Nevada/Utah	Milford, UT	Ely, NV
Nevada/Utah	Milford, UT	Coyote Spring Valley, NV
Texas/New Mexico	Clovis, NM	Dalhart, TX
Split Basing Alternative		
Nevada/Utah-Texas/New Mexico	Coyote Spring Valley, NV	Clovis, NM
No Action Alternative	NA	NA

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Table 6.5-1. Criteria to identify Proposed Action (preferred alternative).

Operational Requirements (See Section 6.5.1) Airfield Operations Cluster Proximity Rail and Road Access Deployment Area Traffic and Physical Security Water Supply
SALT Monitoring Considerations (See Section 6.5.2)
Impacts on Biophysical Environment (See Section 6.5.3) Air Quality Biological Resources
Social and Economic Environment (See Section 6.5.4) Population Change Labor Force Native American Culture and Resources Quality of Life Local Acceptance
Mitigations (See Section 6.5.5)

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The Delta, Utah location at 4,700 ft above sea level requires the fewest waivers with no violation in the most critical approach and departure area. Beryl and Milford (5,200 - 5,100-ft elevations, respectively) are likewise free of violations in the approach/departure area, however, Beryl has flanking terrain to the north 3,000 ft above runway elevation while Milford has terrain 1,600 to 2,500 ft above runway elevation on both sides of the approach/departure corridor. Coyote Spring, at 2,500 ft elevation, has violations due to terrain some 1,500 to 2,000 ft above runway elevation on both sides of the approach and departure zone. Moreover, 11 mi south of the airfield site, terrain 2,600 ft above runway elevation is directly in line with the runway. The Ely runway elevation is 6,550 ft, with terrain rising 4,300 ft above the airfield to the west and 3,200 ft to the east. Moreover, a number of violations occur at both ends of the approach/departure zone.

Being significantly lower in elevation than the other sites, Coyote Spring supports the greatest payload capacity for large transport aircraft operating from a 12,000-ft runway. By contrast, Ely supports the least capacity; its elevation and more northern location may also adversely affect airfield operations because of harsher winters. Weather environments appear less stringent for the other four potential bases.

From the standpoint of airfield operations, the Delta site is the most preferable location. Ely is the least preferable, requiring waivers to AFM 86-8 at both ends of the approach/departure corridor. Coyote Spring is preferable to Ely in terms of airfield criteria and increased aircraft payload capacity. The order of preference is Delta, Beryl, or Milford, then Coyote Spring, and Ely.

Cluster Proximity (6.5.1.2)

The operating base complex with the Designated Assembly Area (DAA) should be located centrally with respect to the deployed M-X clusters. Proximity to the centroid of the deployed clusters reduces the extent of the Designated Transportation Network (DTN). It also reduces the construction cost and the recurring expenses of transportation between the designated deployment area and the operating base. Depending on the location of the second operating base, cluster proximity also determines the utility of co-locating an Area Support Center at the base of security personnel. The length of the DTN to the centroid of the entire M-X deployment region is a measure of the effectiveness of the initial base in servicing the entire deployment. For the second operating base location the length of the DTN to the centroid of the 100 missiles it would support would be a similar index of its effectiveness. A third measure for comparison is the number of clusters within a 63-mi radius; this reflects the feasibility of providing 30-minute response by helicopter to the identified clusters. These indices are calculated on the basis of conceptual cluster siting information, and should be taken as indicative, not definitive, measures (see Table 6.5.1-1).

Table 6.5.1-1. Preliminary base-to-cluster proximity indicators.

PARAMETERS	BERYL, UT	COYOTE, NV	DELTA, UT	ELY, NV	MILFORD, UT
DTN Distance to Centroid 200 Clusters (N.M.)	190	110	-	70	195
DTN Distance to 100 Clusters (N.M.)	95	-	130	-	100
Number of Clusters Within 55 N.M.	57	11	88	108	39
Overall Rank	3	2	5	1	4

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Ely appears somewhat preferable to Coyote Spring in terms of proximity to the clusters. All three Utah locations are less suitable as the primary operating base than either Nevada site, but would be well suited as the second base. Milford and Beryl are almost equally as suitable, but either is clearly preferred over Delta.

Rail and Road Access (6.5.1.3)

Main line capacity rail access is desired for the base containing the Designated Assembly Area to accommodate delivery of the first stage of the M-X missile and launcher modules. Rail access to either base facilitates movement of construction materials and equipment as well as normal logistics.

All three Utah sites are located near the Union Pacific rail segment that joins Las Vegas and Salt Lake City. Short spurs would connect Beryl or Milford to the national rail network while a 16-mi spur would connect Delta. In Nevada, the location of an initial operating base at Coyote Spring would require construction of a 30-mi rail segment to connect to the Union Pacific Railroad. Location of an initial operating base at Ely would require construction of a 17-mi spur from the DAA site to East Ely, which is served by the Nevada Northern Railway Company, owned by the Kennecott Copper Company. The line runs 137 mi to a connection with the main Southern Pacific line at Cobre, Nevada. Capacity of the Nevada Northern track is limited by the use of 60 lb rails on straight sections and 90-lb rails on curves, which limits both axle loads per car and maximum speeds. Without improvement, delivery of heavy loads would require transfer to 6-axle cars and travel at no greater than 5 mph. Refurbishing the Nevada Northern with 117 to 132 lb rails would cost approximately $48 million (1980 dollars), portions of which might be shared with Kennecott Copper and other users.

Utah base locations have access to Interstate 15 between Salt Lake City and Las Vegas. Within Nevada, however, U. S. 93 and U. S. 50 would require improvements to accommodate M-X-induced traffic in peak years. Note, however, that improved roads may encourage travel with attendant adverse impacts on air quality, noise, and energy consumption.

Overall, the Utah sites have better existing railroad and highway access than the Nevada sites. Within Utah, Milford and Beryl are equal and preferred over Delta. In Nevada, Coyote Spring is slightly preferred over Ely due to the probable need to refurbish the 137-mile Nevada Northern track to East Ely.

Deployment Area Traffic and Physical Security (6.5.1.4)

Off-duty base personnel, their dependents, and the public can be expected to travel regularly between the base and large population or recreation centers. All three of the Utah base sites are close to existing Interstate 15. Traffic increases will be east of the clusters.

If the operating base were at Coyote Spring, the major road traffic would be to and from Las Vegas along an improved segment of U.S. 50/93. Such traffic will be directed south from the deployment area. Basing at Ely poses the most serious traffic interaction problems, since roads connecting Ely with Salt Lake City, Las Vegas, and Reno will draw people through the heart of the deployment area. Moreover, a base at Ely may cause portions of the DTN to be used as a route to population centers, especially Las Vegas. While the DTN will be open to the public, it is desirable to minimize travel in the deployment areas.

From the standpoint of minimizing civilian and off-duty military personnel traffic through the deployment areas, there is little to distinguish among Milford, Beryl, and Delta in Utah. In Nevada, Coyote Spring is substantially preferred to Ely.

Water Supply (6.5.1.5)

Water is one of the most significant issues related to M-X. It influences operations, environmental impact, social impact, Native American rights, and local economics. Water availability is also essential for construction and operationg of the support base.

The primary operating base and support community will need from 5,000 to 7,000 acre-ft of water per year. Water requirements during the period of base construction range from 6,000 to 7,000 acre-ft per year during the period of peak consumption. While these requirements are temporary, they should be compared with existing uses, for example 24,000 acre-ft for the White Pine Power Project.

In general, information on groundwater systems in the Nevada/Utah area is quite limited. Most information is for shallow and intermediate depth aquifers. Table 6.5.1-2 shows the estimated perennial yield, current usage (both type and quantity) of water for each of the potential OB sites. A narrative assessment of each of the locations is presented below.

Ely (Steptoe Valley). Steptoe Valley is a designated basin, which means that all the water is appropriated, but not all the groundwater is presently used. The estimated perennial yield exceeds current usage by approximately 14,000 acre-ft per year. The White Pine Power Project (WPPP) has applied for 50,000 acre-ft (although only 24,060 acre-ft are estimated to be needed) in this valley, making it a designated valley. The State Engineer's Office has indicated that the Air Force should not exclude Steptoe Valley from consideration because it is designated, since there also are some indications that residents in this area may be willing to sell their water right to the Air Force, and WPPP may be willing to sell or release water not needed.

Table 6.5.1-2. Water resources for alternative operating base suitability zones (Nevada/Utah).

POTENTIAL SITE	PERENNIAL YIELD (ACRE-FT PER YEAR)	CURRENT USAGE		QUALITY
		QUANTITY (ACRE-FT PER YEAR)	PRINCIPAL TYPES	
Ely	70,000	56,000[1]	Irrigation/ Industrial	Good to Poor
Milford	58,000	65,000	Irrigation	Good to Fair
Beryl	35,000	79,000	Irrigation	Good
Coyote Spring Valley	2,600 (18,000)[2]	3,000	Irrigation	Fair
Delta	23,000	28,000 (50,000)[3]	Irrigation	Fair to Poor
Tonopah	3,000	Minor	Livestock	Poor

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[1]White Pine Power Project has filed for 30,000 acre-ft per year which makes Steptoe a designated valley.

[2]A 1964 report indicated a perennial yield of 2,600; current estimates are as high as 18,000.

[3]Usage from 1963-1977 averaged 28,000; however, recent usage has reached 50,000.

Delta (Sevier Desert). The Intermountain Power Project (IPP) has purchased water rights in the area. Water rights are still available for the Air Force to purchase, however, the State Engineer's Office could limit such purchases. Overdrafting of the water supply has increased significantly in recent years.

Beryl (Escalante Desert). The existing withdrawal of groundwater in the Beryl area exceeds the estimated perennial yield. Most of the groundwater is used in the Enterprise area, south of Beryl. The majority of land in this area is privately owned and purchase of existing water rights may be coincident with the land purchases. The Beryl area is surrounded by mountain ranges on three sides and capture of precipitation and snow melt runoff from the mountains could potentially fulfill some of the water requirements.

Milford (Escalante Desert). All of the groundwater in the Milford area is appropriated and being used. Water levels have declined as much as 30 ft in some areas between 1950 and 1970. According to the State Director of the Division of Water Rights, no additional groundwater appropriations can be made. Therefore, either water rights must be purchased or another source, such as a deep carbonate aquifer, must be developed. There are some indications that the carbonate rock in this area is permeable and may have large quantities of groundwater in storage.

Coyote Spring Valley (Kane Springs, and Muddy River Springs Area). There is considerable uncertainty over the perennial yield of the valley, variously estimated between 2,600 acre-ft and 18,000 acre-ft. There is clear legal opposition to additional groundwater extraction from water users in the Moapa Springs area to the southeast, who reportedly receive their water from Coyote through underflow in the carbonate rocks. Purchase of existing water rights from adjacent Meadow Valley may be a viable alternative. (In addition, a proposal has been provided to the Air Force by the Las Vegas Water District to supply treated potable water by pipeline from Las Vegas.)

In an overall assessment of water supply, each base location except Ely would contribute to overdrafting--using more water than the local area produces. To conform to state water laws in Utah, the Air Force would have to purchase existing water rights (currently used primarily for irrigation). The proportion of current water use needed ranges from 9 percent at Beryl, 11 percent at Milford, to 14 to 25 percent at Delta.

At the Coyote Spring site, the perennial yield is uncertain. The range of estimates is so wide that in the worst case the long-term base requirements are more than double the current usage. In the best case, the requirement is less than the unused perennial yield.

Current water resource information and subjective judgment ranks base locations, in the absence of mitigating factors, from lowest adverse impact to highest adverse impact in the order of Delta or Ely, Beryl, Milford, and Coyote Spring.

SPLIT MONITORING (6.5.2)

The M-X system design incorporates numerous features to facilitate future arms control monitoring procedures. Two are potentially important to locating the operating bases containing the designated assembly area (DAA). The special transport vehicle (STV) that carries the missile to its cluster must be observable by national technical means of verification within the designated assembly area and when it moves along the designated transportation network. Therefore, potential locations for bases contained the DAA have been selected outside the deployment area in order to build confidence in those who monitor our activities that we have not violated agreements or made any suspicious or surreptitious deployments.

Two criteria develop from verification considerations. First, the travel time between the DAA and the nearest cluster should be at least 90 minutes by the STV. This allows at least one pass by an observing satellite in low orbit. (We assume that technology will allow detection of night movement of the STV.) Assuming that the STV can move at a maximum of 30 mph, this would translate to locating the base 45 miles from the closest cluster. A second consideration is cloud cover. For optimum verifiability, STV movements and designated assembly area activities should be obscured by cloud cover as infrequently as possible. These criteria favor Coyote Spring over other potential locations. Table 6.5.2-1 indicates meteorological information for candidate sites. Table 6.5.2-2 provides cloud-cover data showing an overall advantage for the Coyote Spring Valley, Nevada, site.

IMPACTS ON BIOPHYSICAL ENVIRONMENT (6.5.3)

The alternative base locations are sited to avoid direct impacts on threatened or endangered plants and known habitats and ranges of animal species. However, M-X bases are anticipated to have indirect effects on protected resources that may affect the relative desirability of a site. Two of the particular impacts which were used for comparison are those related to air quality and biological resources.

Air Quality (6.5.3.1)

Ely is located in Steptoe Valley, an air quality non-attainment area for SO_2. It has been proposed also as a non-attainment area for total suspended particulates (TSP). While base contributions to SO_2 pollution may be negligible, contributions to TSP, particularly dust raised during construction, may be significant. Additional air pollution by the WPPP may make mitigation of TSP levels difficult.

Table 6.5.2-1. M-X operating base weather conditions.

	BERYL[1]	DELTA	MILFORD 1 & 2	COYOTE SPRINGS	ELY
Annual Rainfall (in.)	8.4	7.2	8.4	8.4	8.1
Mean Number of Thunderstorm Days	34	24	34	12	29
Annual Snowfall (in.)	33.7	21.5	33.7	7.1	46.2
Number of Days Visibility is Less than 1/2 mile	10.1	16.3	10.1	2.2	6.0
Mean Maximum Temperature in July (Degrees F)	92	94	92	96	86
Mean Minimum Temperature in Jan. (Degrees F)	13	14	13	17	9
Percent of Time Wind Frequency Exceeds 17 Knots	14	7.8	14	6.5	8
Ranking	4	3	4	1	2

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[1]Milford data used for Beryl.

Table 6.5.2-2. Mean annual percent frequency of occurrence of 39 percent or less cloud cover at operating base vicinities.[1]

BASE LOCATION	FREQUENCY OF HAVING 30 PERCENT OR LESS CLOUD COVER	
	DAY PERCENT	NIGHT PERCENT
Coyote Spring Valley, NV	52	53
Beryl, UT	43	44
Milford, UT	45	43
Ely, NV	38	46
Clovis, NM	49	54
Delta, UT	40	45
Dalhart, TX	45	45

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[1]Rounded to nearest 1 percent.

Coyote Spring is at the north edge of Clark County, which is designated as a non-attainment area for TSP, O_3, and CO. Increased emissions of these pollutants will require offsetting actions by other sources to maintain air quality standards of the Las Vegas Air Quality Plant.

Beryl is located within 100 mi of both Zion National Park, a designated Class I air quality area, and Cedar Breaks National Monument, a proposed Class I area. Increased dust caused by construction occasionally may affect visibility in these areas.

Milford, Delta, and Beryl are each affected by local blowing dust, which will be exacerbated during construction.

Biological Resources (6.5.3.2)

Beryl. The grazing of pronghorn antelope on ranges in the vicinity of this site could be affected by recreational activity. Increased recreational activity also may affect populations of Utah prairie dog and bald eagle.

Coyote Spring. The road to the Coyote Spring site intersects a migratory route of the bighorn sheep. Increased road kills may be anticipated. The habitat of a Nevada-designated rare plant, the Steno sandwort, is within 2 mi of the proposed site. Unique habitat is threatened by off-road vehicles and increased population. Potential effects on the desert tortoise are not yet documented.

Groundwater used to support base operations may affect the Moapa Fish Sanctuary--habitat of Moapa varieties of dace, White River springfish, speckled dace, Valley turban, tyronia, and creeping waterbug. Other protected aquatic species may be affected by groundwater needs of communities that may develop near the base.

Delta. The base site is proximate to a protected plant species, the Terrace buckwheat.

Ely. Large populations of pronghorn antelope range in Spring and Steptoe valleys. While the proposed base does not intrude on the range, indirect effects are anticipated due to poaching. Cutthroat trout and relict dace, are in Steptoe Valley and several other aquatic species are protected in the White River area.

Milford. Effects similar to those at Beryl are anticipated except for lesser effects on the pronghorn antelope. The location of the operating base may affect key habitat areas.

A preliminary assessment of biological impacts is that the Utah locations will be less affected than the Nevada locations. Within Nevada, the Coyote Spring Valley area is a more fragile environment than Steptoe Valley because of the potentital consequences of ground-water extraction.

IMPACTS ON SOCIAL AND ECONOMIC ENVIRONMENT (6.5.4)

The scoping process and subsequent meetings with residents of the Nevada/Utah region emphasized a predominant concern about the social and economic impacts of M-X deployment. Local concerns focus on the disruptions caused by rapid development and the "boom" that brings increased population and rapid spending, as well as the potential "bust" of the departure of a large labor force as M-X construction is completed. This section addresses some preliminary and gross indices of the relative impact of base construction on local communities.

Population Change (6.5.4.1)

An operating base will require approximately 5,200 people directly employed to operate and support the M-X system. The first base, which will include the designated assembly area and operational base test site, will require an additional 1,800 direct personnel. Including dependents and people drawn to the region by M-X, population increases will be approximately 32,000 and 21,000 for the first and second base, respectively. These numbers depend greatly on how local communities respond to increased demands for goods and services and on assumptions about the proportion of people who live onbase.

Labor Force (6.5.4.2)

Proximity to a labor force will be important to the social impact of economics of M-X. One of the objectives of the program is to provide stable and long-term employment to residents of the region. A large proximate labor force may reduce the impact of transient workers and increase rewards to those with a stake in the future of the region. An opportunity arises for the program to substantially reduce unemployment, especially among younger people and disadvantaged minorities. In terms of economic impact, proximity to a large labor supply also may reduce pressures which inflate local wage rates.

Native American Culture and Resources (6.5.4.3)

Potential impacts on Native Americans of the region fall into two categories: impacts to cultural or religious resources and impacts to the land, water, and human resources of Indian reservations or colonies. Productive land, access to water, and preservation of sacred areas are essential to the survival of a distinctive culture in the Great Basin. An overview of potential impacts of alternative base locations follows.

Coyote Spring. The Moapa Indians have objected to an operating base in the Coyote Spring area because their reservation depends on water from Muddy River Springs and the White River drainage systems. While it appears that water used for shelter construction would have a moderate and short-term effect on these resources, the additional effects of base construction and long-term demands for base support probably would reduce the flow of Muddy River Springs. Reduced flow would diminish present greenhouse and cattle operations and undermine a proposal for expansion of reservation lands. The Moapas claim water rights derived from a treaty with the federal government.

The Moapas have outstanding a proposal to expand their reservation by 70,000 acres. The Coyote base alternative is sited to avoid these lands, but it intersects a major seasonal migration route of the Southern Paiutes associated with a wide variety of sacred features. Nearby Arrow Canyon is considered sacred by contemporary South Paiutes and disturbance by increased visitation increases the threat of vandalism and theft of sacred sites or objects. Avoidance and mitigation of these potential impacts is discussed in Section 6.5.5. There are no identified Native American lands or water resource associated with other sites.

Of the four remaining sites, Ely and Delta are somewhat more susceptible to possible impacts to unidentified Indian artifacts because of the higher density of historic activity in proximate areas.

Coyote Spring has the greatest potential for negative impacts on Native American cultural [illegible] resources. Of the Utah sites, Delta and Beryl [illegible], but each potentially competes with Native Americans' [illegible] their reservation holdings. With respect to the [illegible] labor, the Ely Colony will be most hard hit under [illegible] but it faces a similar problem resulting from [illegible]. All, the preference in terms of the least adverse [illegible] on Native Americans are Ely, then Milford, [illegible] measures to mitigate water problems, Coyote [illegible].

Quality of Life (6.5.4.3)

Quality of life is a subjective and intangible consideration that nevertheless is important. Bases near isolated, very small towns typically have tangible problems with poor morale, discipline, and personnel retention. Isolated locations also have tangible effects in a high turnover of civilian, especially construction, personnel. Although every effort will be made to make M-X bases attractive places to work and live and the Great Basin offers unique opportunities for recreation people will need to get away. From this standpoint, quality [illegible] increased by close proximity to a major urban center--[illegible] ment region, that center is Las Vegas.

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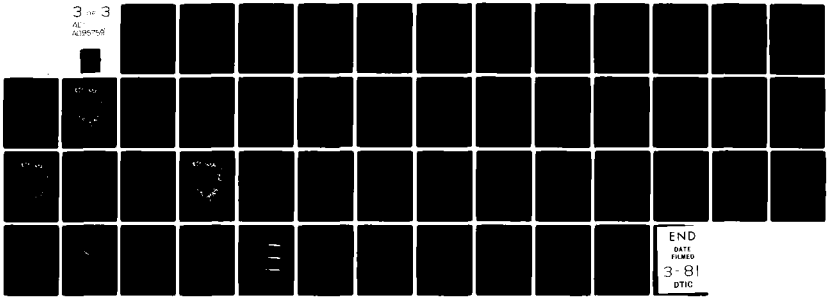
M-X ENVIRONMENTAL TECHNICAL REPORT - SELECTION OF SUITABLE LOCA--ETC(U)
DEC 80 F04704-78-C-0029
UNCLASSIFIED M-X-ETR-1 AFSC-TR-81-01 NL



To the local region, quality of life is reflected in the degree that a large military population disturbs the preferred lifestyles of residents. From this standpoint also, those who chose an urban lifestyle generally would find a military community more acceptable than those who have chosen the Great Basin as a place to get away from urban pressures.

Local Acceptance (6.5.4.5)

The Air Force has had extensive experience in base construction, major unit movements, and base closings. Experience indicates that local attitudes, local leadership, and the planning efforts of the local community are key to mitigating adverse impacts and enhancing benefits of our actions.

In Utah, the best and sufficient evidence of local preference of a base site is an 8 August 1980 letter from Governor Matheson to the Under Secretary of the Air Force which states in part, "This letter constitutes official notification that the local governments which will be impacted by the M-X Missile System, if that system is deployed in Utah, have unanimously selected the so-called Milford site as their preferred location for an operating base to support this sytem. The State Of Utah concurs in this choice."

The State of Nevada has not yet stated a site preference. Although within the state, support from Las Vegas (particularly its business community) for a base located at Coyote Spring Valley is most visible, a statement of such authority as that from Utah has not been made.

SIGNIFICANT MITIGATIONS (6.5.5)

Water (6.5.5.1)

Among adverse impacts affecting the desirability of alternative sites, the most severe is the questionable supply of water at Coyote Spring. Water affects base construction and operations, the biophysical environment, potential development of supporting communities, and Native American resources. An alternative source of water for Coyote Spring radically alters the order preference related to a number of criteria.

The Las Vegas Water District has provided the Air Force with an initial investigation of the feasibility of establishing an alternative, secondary, source of water supply from the Southern Nevada Water System whose source is Colorado River water stored in Lake Mead. The initial investigation indicates that such a system is feasible. A system concept to deliver treated water of safe drinking quality to a community of 30,000 people in the Coyote Spring Valley area has been developed. The quantity of water delivered by such a system over the long term, however, is contingent on the overall needs of Nevada in face of growing

water demand in the Las Vegas Valley and a fixed allocation of the Colorado River supply. A system designed to provide 9 million gallons per day to Kane Springs and a supply of 700,000 gallons per day of secondary-sources water to Nellis AFB would cost approximately $53 million (1980 dollars). Costs would be shared among those who benefit from the system. A 4 million gallon reservoir to support joint AF/civilian use of the system would cost an additional $10 million which would be offset in part by reduced storage and treatment needs at the base.

In terms of biophysical impacts, secure sources of water at Coyote Spring Valley would relieve numerous concerns for the fragility of Kane Springs Valley. Further, importation of water may improve flows to Muddy River Springs which are of such concern to the Moapa Reservation.

Air Quality (6.5.5.2)

Mitigation of potential pollution and safety impacts of increased vehicle traffic is desirable at all base locations. Measures to minimize the number, driving distance, and emissions of community vehicles are planned for all stages of M-X construction and operation. The problem of highway traffic, however, is exacerbated if the base is located within commuting distance of Las Vegas--particularly when Clark County already must control ozone and carbon monoxide to meet air quality standards. An ooportunity exists to mitigate the effects of increased highway traffic, however, by servicing Coyote Spring with rail transit from Las Vegas. Other base locations would each be served by road connections to several scattered supporting communities; Coyote Spring would provide the opportunity to develop a more energy efficient, less polluting, and safer mode of transport.

Concepts for rail-supported transport at Coyote Spring are being studied. Several types of equipment for such a system are in operation elsewhere.

Native Americans (6.5.5.3)

At the request of the Air Force, the President's Advisory Council on Historic Preservation has prepared a Programmatic Memorandum of Agreement pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended. This agreement, when signed by the Air Force and cooperating agencies, will assist in the protection of historic and culturally important properties. It provides for surveying, preparing plans, coordinating with appropriate agencies, and avoiding or mitigating adverse impacts. Studies to be carried out under the agreement will contribute significantly to the knowledge of cultural and historic resources in the program regions.

SUMMARY OF PREFERENCE RANKINGS (6.5.6)

Throughout Sections 6.5.1 through 6.5.4 an order of preference was indicated for each of the criteria considered. Table 6.5.6-1 summarizes those preferences using a rank order (ordinal) scale for each criterion. By convention, indifference among potential locations is reflected by equal average ranks. For example, if the differences were indistinguishable between the number 2 and 3 alternatives each would be awarded a 2.5 ranking.

Columns could be totaled to achieve an overall order of preference, but such a mechanical procedure would be analytically legitimate only if criteria were exhaustive, mutually exclusive, and of equal weight by some measure of a decisionmaker's values. The rank order highlights the fact that there is no consistently predominant site alternative. Preferences tend to offset each other.

Preferences by State (6.5.6.1)

Table 6.5.6.1-1 shows the same ranking conventions applied to the three proposed locations in Utah and the two in Nevada.

The two sites in Nevada are Coyote Spring and Ely. Coyote Spring is prefereable over Ely for the following reasons:

- Airfield Operation
  - Coyote Spring has potentially fewer waivers to AFM 86-8
  - Runway elevation at Coyote Spring is approximately 3,250 ft lower than Ely.
  - Coyote Spring has better meteorological conditions (i.e., visibility, snowfall, temperature changes)
- Railroad Access
  - Coyote Spring would require constructing 30-35 mi of new railroad whereas Ely would require 80-85 mi of upgrading and new construction
- Road Access
  - Access from I-15 is only 30-35 mi from proposed site at Coyote Spring
  - Coyote Spring does not have mountain pass problems as does Ely

Table 6.5.6-1. Summary of preference rankings.

	BERYL, UT	COYOTE, NV	DELTA, UT	ELY, NV	MILFORD, UT
Airfield Operations	2.5	4	1	5	2.5
Cluster Proximity	3.5	2	5	1	3.5
Rail/Road Access	1.5	4	3	5	1.5
Physical Security	2	4	2	5	2
Water Supply[1]	3/4	5/1	1.5/2.5	1.5/2.5	4/5
Considerations	3.5	1	3.5	3.5	3.5
Air Quality[1]	3/3.5	4/3.5	1.5/1.5	5/5	1.5/1.5
Biological[1]	3	5/4.5	1.5	4/4.5	1.5
Resources	2	1	3.5	1/1	2/2
Native Americans[1]	3/3	5/5	4/4	1/1	2/2
Quality of Life	2	1	4	5	3
Local Preference	4	2	4	4	1

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[1]Rank without/with significant mitigation.

Table 6.5.5.1-1. Summary of preference rankings by state.

PREFERENCE RANKINGS	NEVADA		UTAH		
	COYOTE	ELY	BERYL	DELTA	MILFORD
Airfield Operations	1	2	2.5	1	2.5
Cluster Proximity	2	1	1.5	3	1.5
Rail/Road Access	1	2	1.5	3	1.5
Physical Security	1	2	2	2	2
Water Supply*	2/1	1/2	2	1	3
Air Quality	1	2	3	1.5	1.5
Biological Resources*	2/1.5	2/2.5	3	1.5	1.5
Population Change	1	2	1	3	2
Labor Force	1	2	1	3	2
Economic/Competing Resources	1	2	1	3	2
Native Americans	2	1	2	3	1
Quality of Life	1	2	1	2.5	2.5
Local Preference	1	2	2.5	2.5	1

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*Rank without/with significant mitigation

- Physical Security
  - Coyote Spring induces less traffic through DDA
  - Coyote Spring is closer to the centroid of the DDA which makes it more desirable for security alert
- Population Change
  - Coyote Spring is situated nearer to a major urban infrastructure
  - Impact of development of an associated offbase support community will be lessened
- Economic Impact
  - Labor force has potential capability of being deployed from Las Vegas
  - Las Vegas has an established infrastructure that will mitigate M-X economic impacts
- Quality of Life
  - Las Vegas is only 55 mi away and can provide the socio-economic base
  - Las Vegas can provide a variety of socio-cultural aspects such as restaurants, major stores, theaters, night life, education, and galleries
- Local Acceptance
  - Las Vegas wants to help support the Coyote Spring mission for it will provide jobs, housing, and other attributes to the community

Ely is preferable to Coyote Spring in terms of cluster proximity, air quality, biological impact, and Native American interests. With respect to water supply, on balance it would appear that a secondary source backup from Lake Mead would be preferable to contesting for rights with the WPPP. With assured water at Coyote Spring, biological impact becomes one of equal concern between the two sites. In a gross sense, operational and socioeconomic considerations favor Coyote Spring. Biophysical considerations and concerns for Native Americans favor a location at Ely.

In Utah the comparisons are less simple. Delta is least preferred in terms of socioeconomic variables. Operationally, distance from the deployment region and from established rail or road systems mitigate against Delta as a preferred choice. Between Beryl and Milford there is little to distinguish the two sites except somewhat better local sources of water at Beryl. With respect to social and economic variables, impacts on the local communities are of such magnitude in comparison with existing resources that a preference relies on strategies for mitigation developed in coopration with local agencies. From the standpoint of the biophysical impacts and Native Americans both sites are of the same ecological, hydrographic, and cultural region.

SITE PREFERENCE (6.5.7)

The NEPA scoping process and thousands of hours of face-to-face communications among Air Force representatives and residents of the deployment region emphasize local concerns for the economic and social impacts of M-X. Likewise, the Air Force feels deep concern for the social and economic impacts of its basing decisions on the people and communities involved. If essential operational, environmental, and cost requirements can be met, the Air Force chose to locate where there will be the most acceptance and least disruptance. The reason is simple--Air Force uniformed people, their dependents, and supporting civilians will live there too.

Site Preference--Utah (6.5.7.1)

In Utah, a site preference is clear. No consideration thus far uncovered in the process of M-X base selection overcomes the statement of preference for Milford by Governor Matheson on behalf of the state of Utah. Indeed, considerations important to the Air Force other than local preference, on balance, support the same conclusion. Milford is the preferred site.

Site Preference--Nevada (6.5.7.2)

In Nevada, local preference is less clear. With the exception of Air Force concerns for adverse impacts on the Moapa community, however, social and economic considerations heavily favor locating near Las Vegas. Moreover, with local cooperation and federal assistance to mitigate the potential impacts of water demands and air quality, there is little to distinguish between Ely and Coyote Spring in terms of biophysical considerations as they are understood prior to completion of the EIS. When potential concurrent demands of both M-X and the White Pine Power Project are considered, considerations for the biophysical environment may also favor Coyote Spring over Ely. Contingent on a secure secondary source of water piped from Lake Mead, the preferred site in Nevada is Coyote Spring.

APPENDICES

APPENDIX A

M-X BASING AREA ANALYSIS REPORT

As previously discussed, the results of the initial screening activities, which applied geotechnical, cultural, environmental and topographical criteria, identified land areas which total about 83,000 sq mi scattered throughout the southwestern portion of the country. Each of the suitable areas was re-evaluated for military and operational suitability as described in the following sections.

SUMMARY (1.0)

The continued growth of the Soviet strategic forces poses a serious threat to the survivability of the United States ICBM forces during the 1980s. The security of the United States and its allies has and will continue to depend upon the viability of the United States strategic forces. The ICBM is a unique and integral part of these forces and M-X deployment is critical to the maintenance of this deterrent force. The Department of Defense considers M-X in MPS its highest priority defense program and the Administration and Congress have confirmed its national importance and the criticality of its schedule.

This paper describes the process used to select reasonable basing areas for M-X, concentrating on recent evaluations which led to the selection of two potential basing areas for further study. The selection process began in 1977 with consideration of the entire continental United States. This initial work surveyed basing needs, screened possible areas for M-X deployment, and finally identified six potential basing areas for deployment of M-X in multiple protective shelters. Previous criteria were augmented with military and operational considerations in order to identify which, if any, of the six potential basing areas were unreasonable to pursue.

From a military point of view, it is unreasonable to deploy M-X in a manner which unnecessarily increase (1) potential vulnerabilities; (2) the risk of reduced effectiveness in the face of unforeseen changes in international relationships or technology; or (3) the time, cost, or manpower to acquire and operate the system. Criteria that reflect these factors were developed and used to evaluate the six potential basing areas. These criteria included distance from the coast, distance from international borders, and compatibility with local areas and activities. Two areas, Nevada/Utah and West Texas/New Mexico were found to be reasonable basing choices for M-X deployment as presented in the following discussion.

CURRENT ACTION (1.1)

The decisions explained in this paper are a part of a continuing selection process entailing the successive application of several sets of screening criteria and the identification of unacceptable or unreasonable basing areas. The process began several years ago with criteria involving geotechnical, cultural, safety, and other concerns, and it will continue until final, specific shelter sites are selected.

As the depth of the analyses increases, the breadth may decrease as accumulated information shows that some alternatives are unreasonable. By this process, the Air Force balances a variety of concerns--military effectiveness, operational constraints, environmental impacts, resource efficiency, schedule risk, etc. Each stage of the screening employs criteria that, like most criteria, involve judgment. Clear breakpoints are unusual, but the preferred direction is usually obvious, and unreasonable alternatives are normally easy to distinguish.

Additional screening criteria reflecting military considerations were recently incorporated into the decision process. Through the examination of such factors as survivability, potential new threats, verification, preservation of missile location uncertainty, and interaction with other strategic forces, deployment criteria emerged which could be used to minimize actual and potential vulnerabilities, protect against unpredictable changes, and minimize resource requirements.

Reducing vulnerabilities to potential threats discourages the development of those threats. Unless the costs are exorbitant or there are obvious United States responses, the Soviets must be expected to take advantage of openings presented. Therefore, prudence dictates selection of a basing area or areas that not only considers the relatively short-term, predicted threat, but also minimizes vulnerabilities and facilitates effective United States responses to any potential threat.

A time horizon of at least 30 years should be used to cover the M-X operational lifetime. In a sense, planning for M-X is equivalent to having planned a strategic system over 30 years ago that would be viable today in spite of technological advances and changes in the world situation. Such planning would have had to be done in the late 1940s or early 1950s--just prior to the first hydrogen bomb and the Korean War; 5 to 10 years before the first ICBM, the first satellite, and the Cuban missile crisis; 15 to 20 years before the first man on the moon and the Vietnam War; a time when the world's best computer could not compete with today's hand-held calculators with their transistors and microelectronics; a time when the United States policy of containment was backed by unquestioned nuclear superiority. Unimagined changes will inevitably take place during the lifetime of M-X; planning requires great caution and careful hedging to accommodate future change with minimum impact on national security.

Hence, criteria were developed (Section 1.3) and used to evaluate the six potential basing areas, with the intent of providing reasonable protection relative to both expected and unforeseen problems (Section 1.3.3).

ENVIRONMENTAL SCREENING (1.2)

Pursuant to the National Environmental Policy Act and DOD Directive 6050.1, the Air Force implemented an M-X environmental program which included the preparation of four environmental impact statements (EISs). An EIS was prepared for the M-X Buried Trench Construction and Test Project. A second was prepared as an input to the Milestone II decision on full-scale engineering development (FSED). FSED activities include preparation and publication of two EISs: one for use in the deployment area(s) selection and a second to be used as an input to the Milestone III decision for production and deployment.

The M-X Milestone II EIS compared the environmental effects of candidate basing modes by investigating the impact of deployment in seven basing mode comparison areas (BMCAs) of the United States. The BMCAs represented those regions in which suitable areas for basing M-X has been found. They were chosen after a careful screening of the entire nation using primarily geological and physical criteria.

First, coarse screening criteria were applied to the entire continental United States. This process excluded population center, parks, Indian reservations, and other restricted-use areas from consideration. Intermediate and fine screening criteria applied to remaining areas excluded such things as parcels of aggregate land less than 660 sq mi and areas with grades greater than 10 percent.

For convenience, and because accumulations of suitable land could be grouped into large regions with relatively uniform environmental characteristics, the remaining land was grouped into these seven broad geographic areas:

- Great Basin (most of Nevada and a portion of western Utah)
- Mojave (California)
- Luke-Yuma (SW Arizona)
- White Sands (Central and SW New Mexico)
- West Texas (including Rio Grande and Pecos River basins)
- High Plains (W. Central Texas, E. New Mexico)
- S. Platte Plains (Nebraska, Colorado, and Kansas)

Studies leading to the Milestone II EIS used these areas to determine whether environmental considerations would show a preference for any of four candidate M-X basing modes (vertical shelter, horizontal shelter, hybrid trench, and slope-sided pool). Based upon this evaluation, the Air Force concluded that no one basing mode was, on balance, environmentally

preferable to another. Although each basing mode had advantages and disadvantages that varied depending on the geographic areas considered, these differences were not sigificant enough to favor one basing mode over another. No attempt was made at that time to rank, select, or indicate a preference among basing areas.

However, two significant environmental factors common to all four basing modes became evident. First, a security approach which would restrict access to the aggregate basing area, termed area security, would require that extensive areas of land be reserved for exclusive Air Force use, a restriction which proved to be unacceptable. Second, as spacing between shelters increased, general deployment area requirements increased. Although actual land needed for exclusive M-X use remained constant, the total road requirements increased with associated impacts similarly increased.

The President decided against the area security system and directed the Air Force to adopt the point security system depicted in Section 3. In addition, extensive analysis of projected Soviet ICBM capabilities, nuclear effects, and shelter hardness was undertaken--further refining spacing requirements. The current M-X baseline reflects these changes in the security system and spacing. It thus represents a balance between a variety of concerns.

Since the Milestone II EIS, the Air Force has continued to study and define the M-X/MPS system, permitting an evaluation of the interaction between potential basing areas and military considerations. As a first step, the seven areas previously defined by environmental characteristics were redefined into six areas to reflect militarily logical deployment areas. The six areas are listed below.

- Nevada/Utah (Great Basin)
- California (Mojave Desert)
- Western Arizona (Sonoran Desert)
- Arizona-New Mexico-Southwest Texas (Highlands)
- Western Texas/New Mexico (Southern High Plains)
- Colorado-Kansas-Nebraska (Central High Plains)

The six candidate basing areas considered geotechnically suitable for M-X deployment are depicted as the shaded areas in Figure A-1. If a boundary were drawn around each of these areas, each candidate would encompass about 8,500 or more square miles. This is sufficient land to accommodate a deployment of about 4,600 M-X shelters and associated facilities.

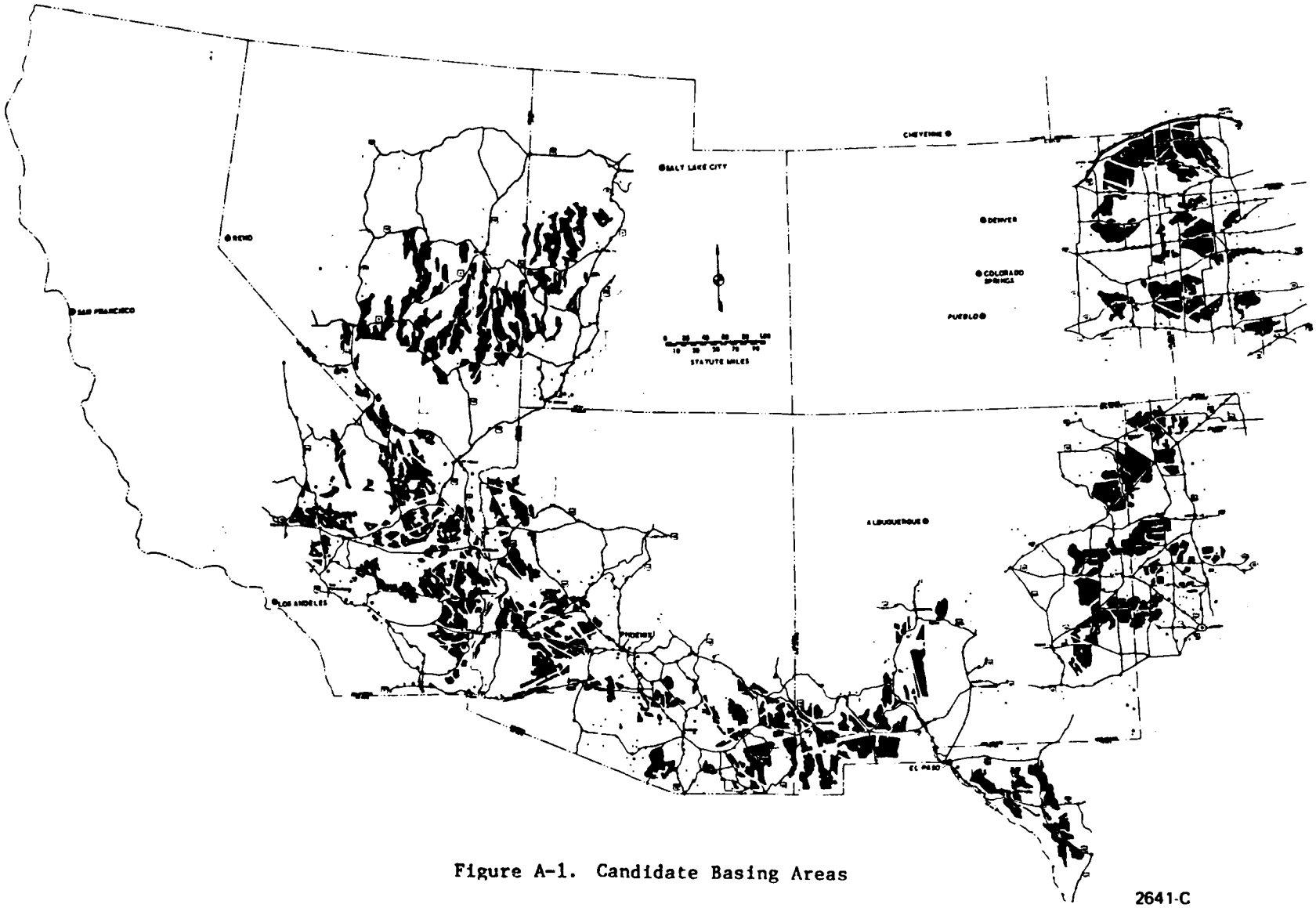

Figure A-1. Candidate Basing Areas

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Figures A-2 through A-7 show pertinent details of each of the six candidate basing areas. The specific geotechnically suitable land is shown as a shaded area on each map. Overlaid on the background of each map are county and state boundaries. Interstate, principal, and other major through-roads which traverse each area are also indicated. Large dots indicate communities for which a population is recorded in either the Rand-McNally Road Atlas (1980) or the "Population Estimates and Projections," (1979). Small dots indicate communities for which no population is recorded in these two sources.

Table A-1 summarizes urban and rural population in the immediate vicinity of the basing areas. The adjacent urban population is determined by summing the population of all cities and towns whose center was within 5 mi of a shaded area. The rural population figures are gross estimates of the people living in the shaded areas on the maps and are determined as follows: the rural population in each affected county was computed by subtracting urban population from total population in the County and City Data Book (1977). Rural density throughout each county is then assumed to be the rural population divided by the area of the county from the County and City Data Book (1977). Finally, the rural population living on the shaded area in each county is computed and then summed for the entire candidate-basing area.

There are some obvious oversimplifications in this process. Rural population is not uniformly distributed throughout each county. This is true of Maricopa County in Arizona, which contains Phoenix, and in Nevada, which has mountainous areas. Also, it is likely that a significant fraction of the rural population resides within one mi of towns and major highways which are excluded from M-X siting. Nevertheless, it is a consistent computation process applied to each basing area and provides relevant comparative data. Figure A-8 shows these comparisons in bar-chart form.

BASING AREA FACTORS AND CRITERIA (1.3)

FACTORS CONSIDERED (1.3.1)

This section covers a variety of factors which will be affected by the basing area selection. These factors will be used in Section 1.3.2 to define screening criteria.

SURVIVABILITY. Assuring the enduring survival of a United States ICBM retaliatory force is the reason for M-X deployment. It is required to restore essential equivalence with the Soviets, through the maintenance of a survivable Triad.

The survivability of the M-X missile depends primarily on preservation of location uncertainty, or PLU. It is, therefore, not advisable to deploy M-X where PLU is difficult to maintain.

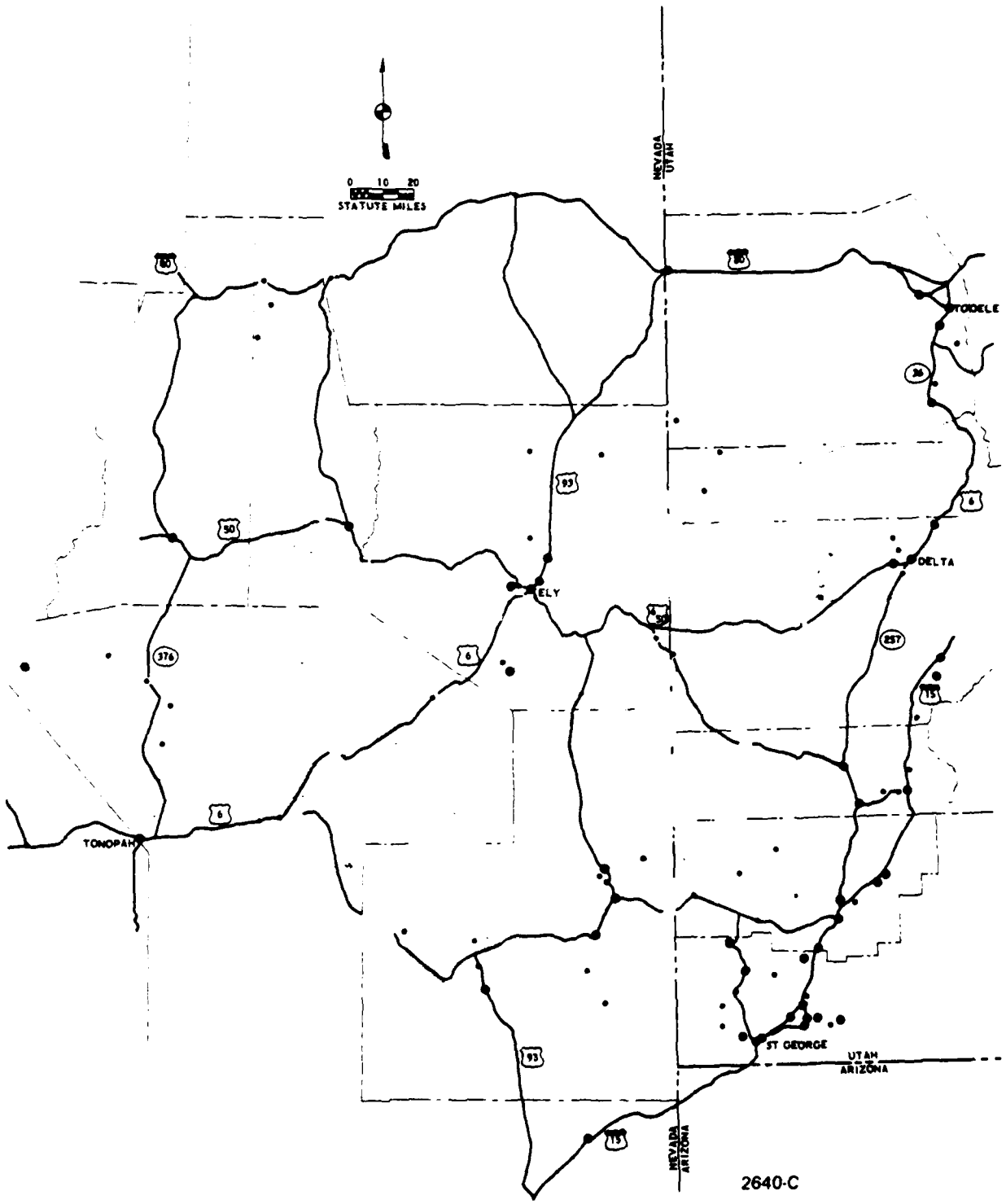

Figure A-2. Nevada-Utah Basing Area

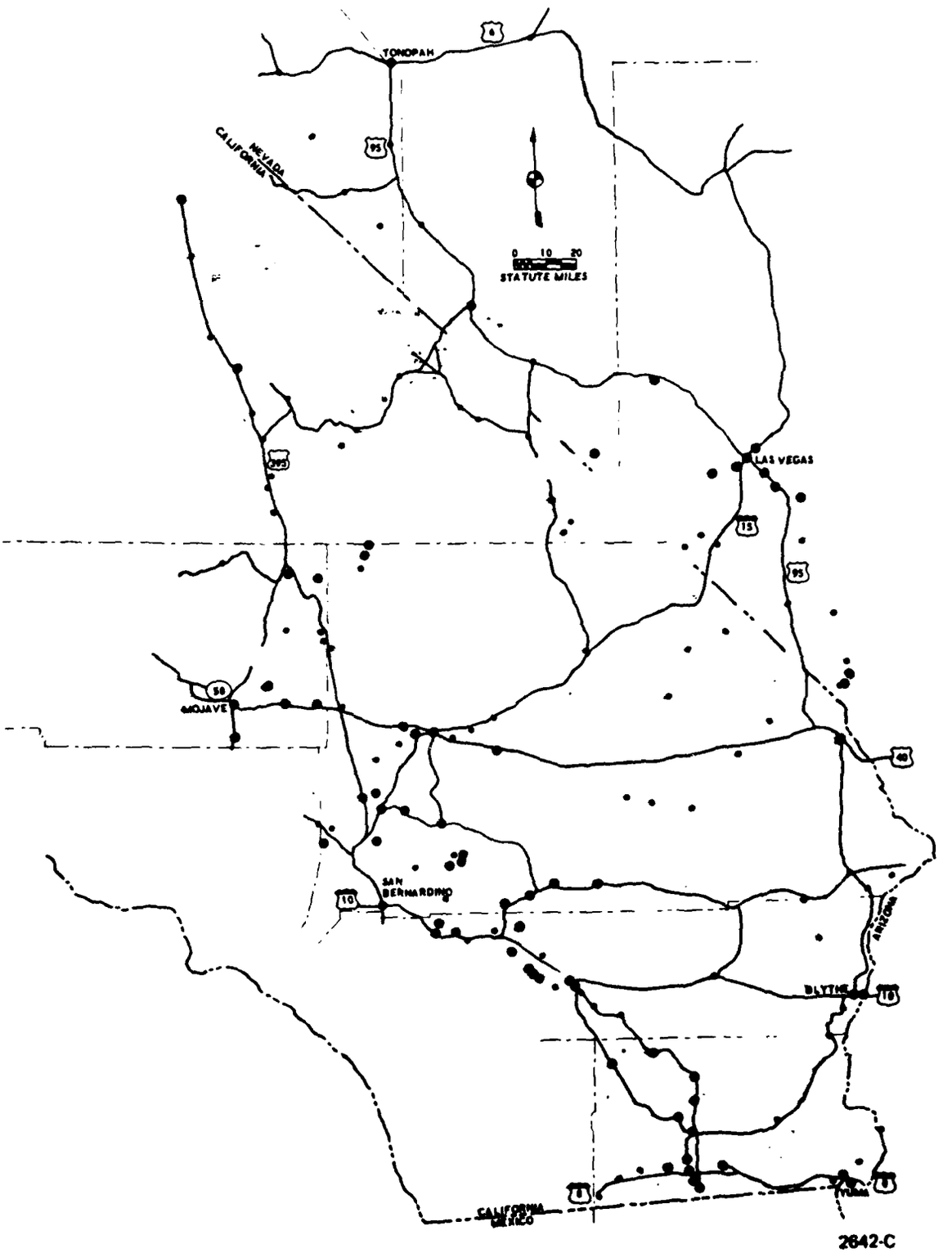

Figure A-3. California candidate basing area.

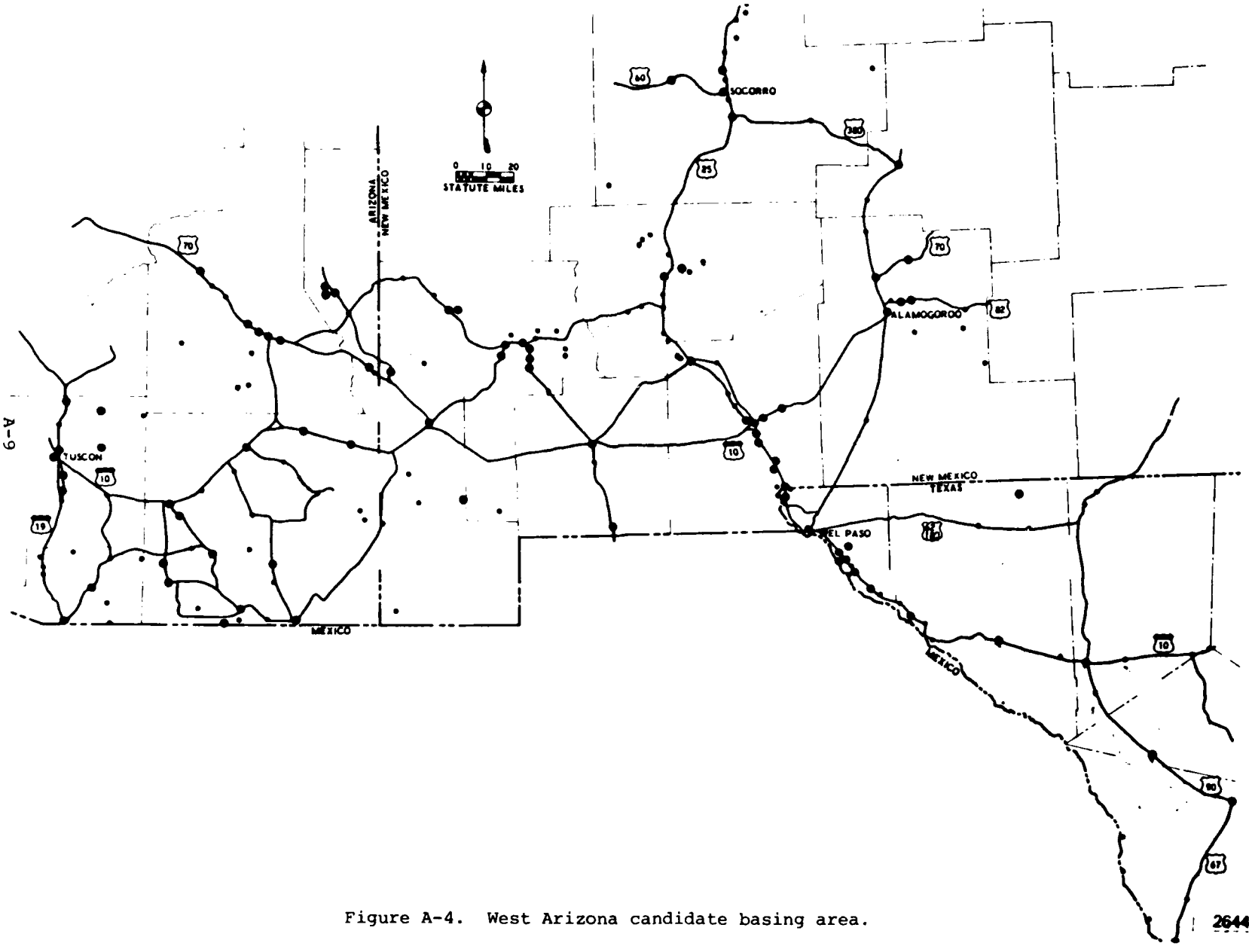

Figure A-4. West Arizona candidate basing area.

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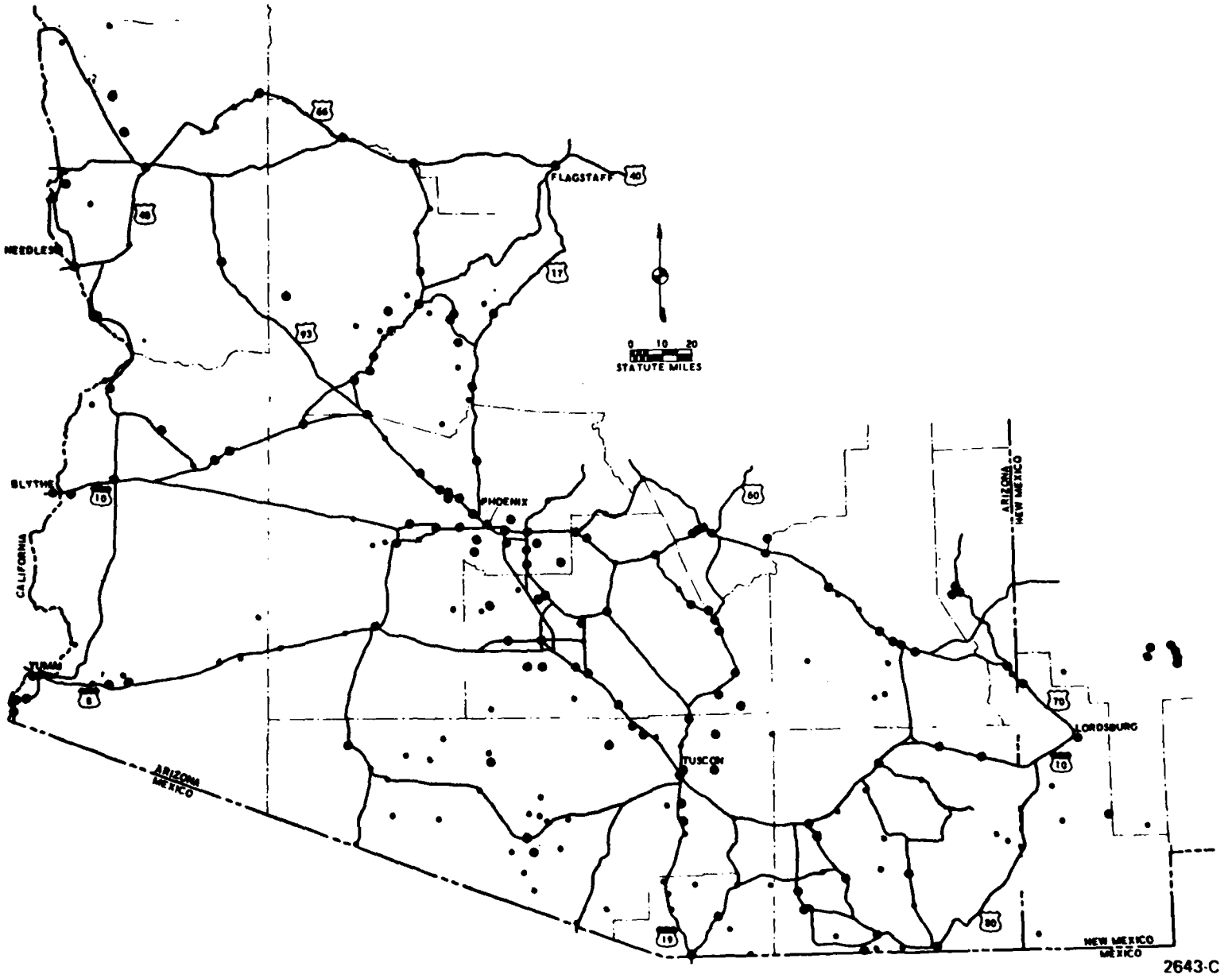

Figure A-5. Arizona-New Mexico candidate basing area.

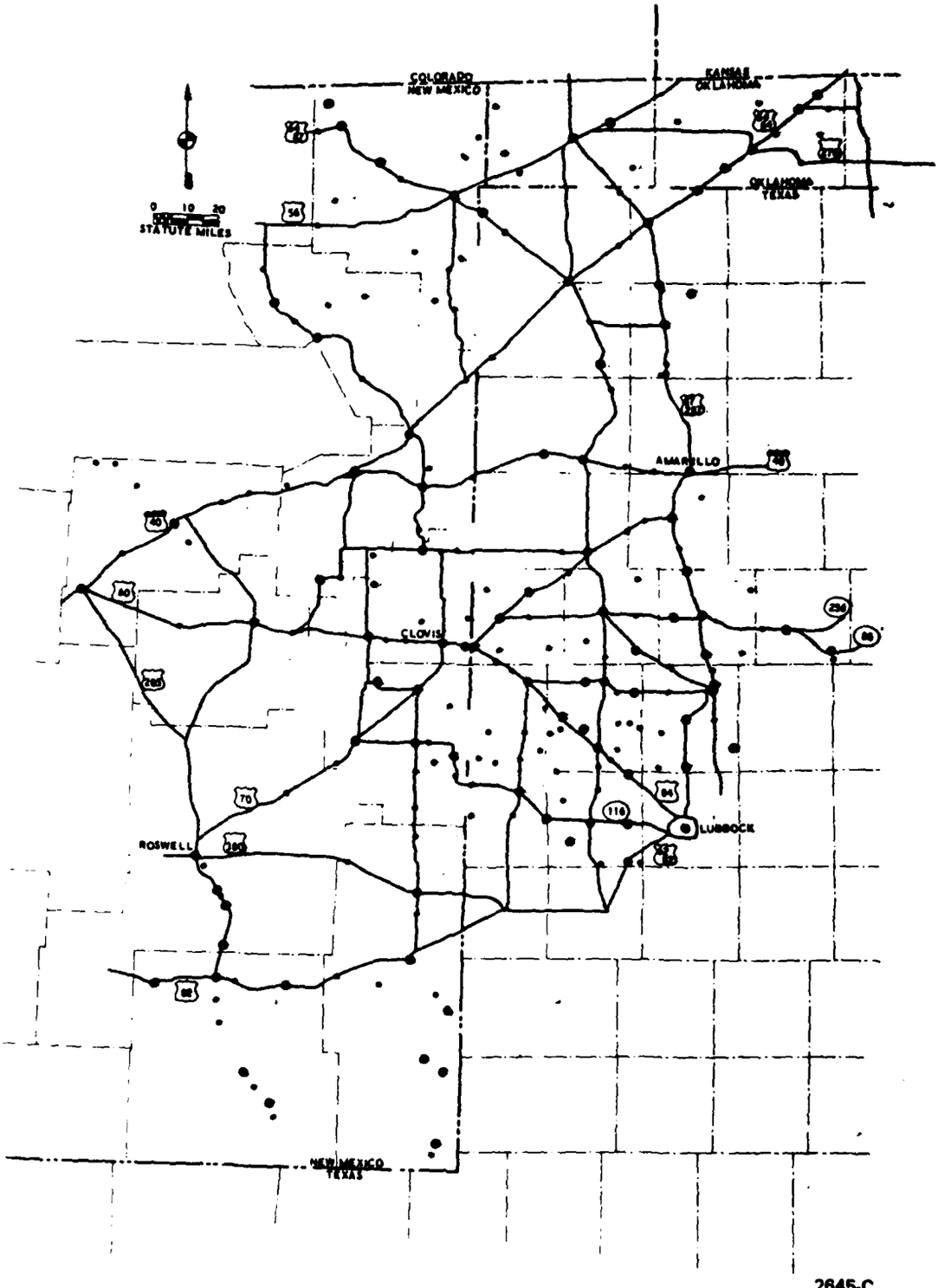

Figure A-6. West Texas-New Mexico candidate basing area.

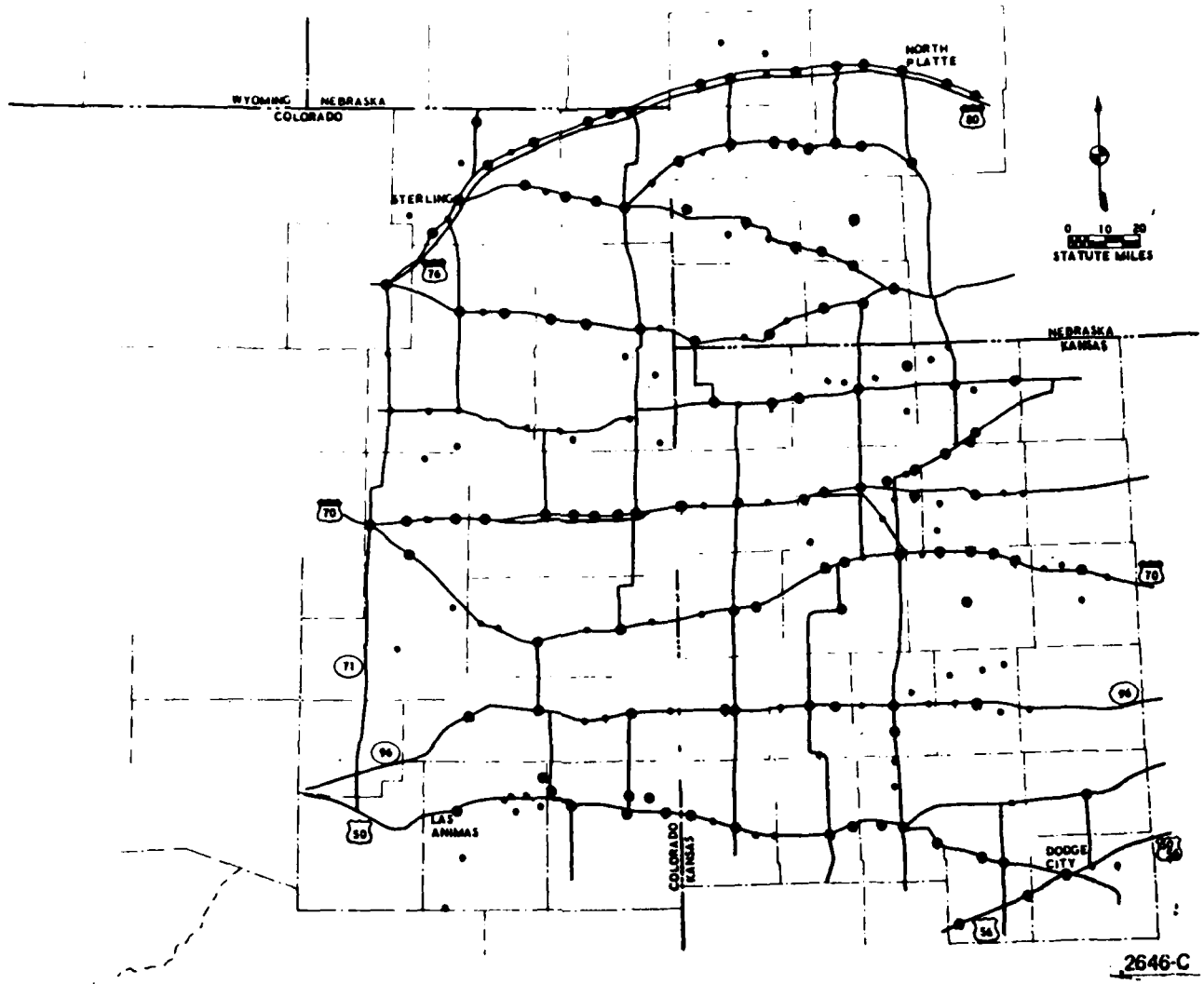

Figure A-7. Colorado-Kansas-Nebraska candidate basing area.

Table A-1. Population within basing areas.

Candidate Basing Area	Population	
	Urban[1]	Rural[2]
Nevada-Utah	4,922	1,215
California	51,811	21,980
Arizona	77,670	13,183
Arizona-New Mexico	57,361	9,449
New Mexico-Texas	83,921	15,504
Colorado-Kansas-Nebraska	55,479	15,123

[1] Towns within five miles of siting parcels

[2] Weighted rural density times 8,550 square miles

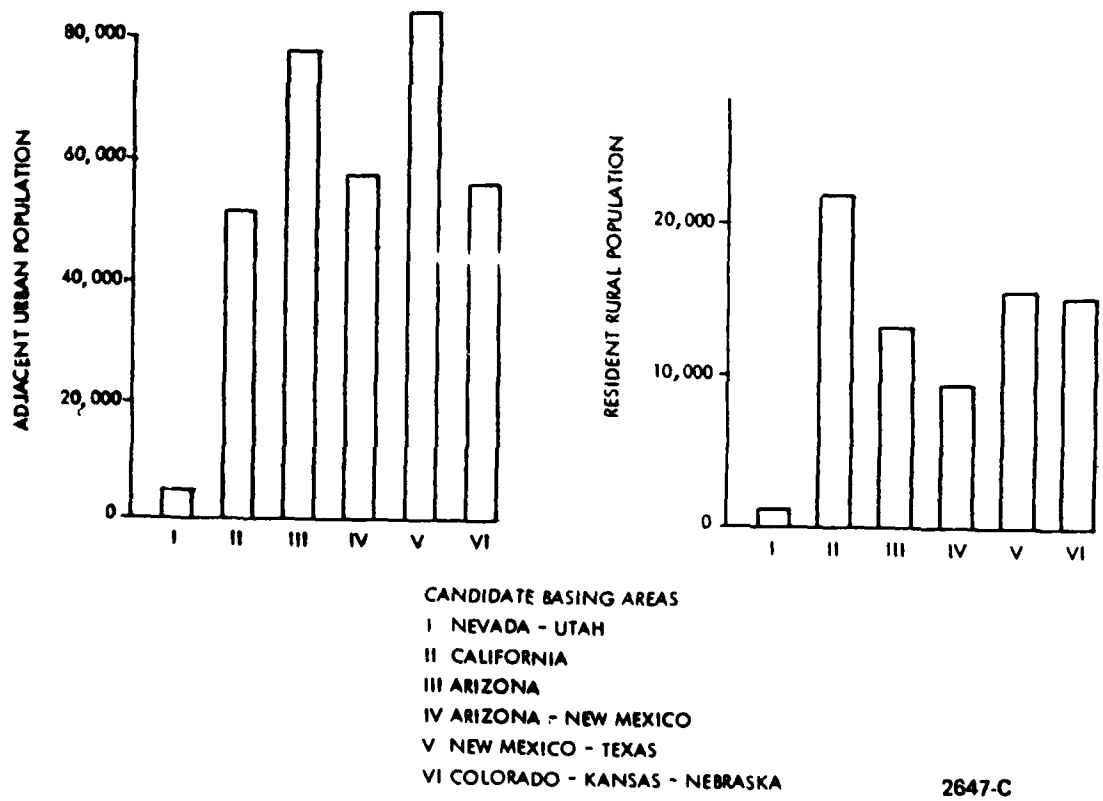

Figure A-8. Basing area population.

In the event that confidence in PLU is temporarily degraded, the system will contain supplementary mobility modes to restore PLU. One mode entails the movement of missiles to different shelters to reestablish concealment. Another allows the missile to be in motion between shelters but still able to reach the nearest shelter within the flight time of SLBMs (submarine launched).

These supplementary modes not only protect the survivability of the system in spite of an unforeseen failure in PLU, they also serve to discourage large Soviet efforts devoted to breaking PLU by reducing the payoff. Hence, it is important to deploy M-X where operation in the back up mobility mode is feasible and relatively invulnerable to enemy attack options.

In addition, survivability even in the face of unforeseen events or greater-than-expected threats is also crucial, and provisions have been made for such cases. In the event the Soviets decide to abandon all arms control constraints and undertake a massive "arms-race" buildup to attack M-X, the United States is maintaining, within the constraints of the Anti-Ballistic Missile Treaty, the option to deploy a ballistic missile defense (BMD). As with supplementary mobility modes and PLU safeguards, the BMD option will help deter a massive Soviet buildup and it is, therefore, wise to deploy the M-X where the optional BMD system will be effective and relatively invulnerable.

The employment and deterrent value of M-X requires survivable, reliable communications. In addition, many essential actions, such as transmittal of launch orders, backup mobility mode instructions, BMD activation, etc., require time-critical communications. Precautions against Soviet disruption of these communications therefore are required.

Peacetime command, control, and communications (C^3) will primarily use a fiber optic cable network connecting the shelters to ground-based operational control centers (OCC). The OCCs are planned for peacetime operations. This peacetime system will be secure and equally effective regardless of the location of the deployment area. Soviet attempts to disrupt peacetime communications are not expected.

For M-X to remain effective, its C^3 system must operate during and after an all-out attack. Such an initial attack would probably destroy the OCCs and disrupt the fiber optic network. The system would then make a transition to radio as its primary C^3 mode. Surviving missiles would use a medium frequency (MF) radio system to relay missile readiness status and targeting information among themselves and to surviving command authorities.

If the OCC is lost in the post-attack period, information to and from the M-X missile force will be passed through an airborne launch

control center (ALCC). Various radio systems will connect the ALCC to the National Military Command System (NMCS), which consists of separate ground and airborne C^3 facilities. The NMCS is the primary link from the President to his strategic forces.

ALCCs will not be able to operate over missile fields, due to potential nuclear effects from an attack on the field. Instead, they will operate outside the M-X field but within 200 mi of it in order to maintain a communication connectivity with the missiles. The location and size of the planned ALCC operating area provides relative immunity from base of the M-X ALCC while allowing acceptable communications between the ALCC aircraft and surviving missiles.

VERIFICATION. Adequate verification is the foundation of arms control and as such is a criterion for M-X MPS deployment. Not only must M-X be consistent with existing Strategic Arms Limitation (SAL) agreements and goals to negotiate mutual arms reductions, it must also set standards for verifiability of mobile ICBM systems on both sides. As a result, the Air Force developed verification procedures that were incorporated into the M-X system, several of which can be affected by activities in the basing area. These verification requirements were, therefore, used to help develop screening criteria.

COST. Military effectiveness depends on the cost-effectiveness of component military force--inefficiencies in one area are paid for with degraded capabilities elsewhere. Thus, the M-X/MPS system design must minimize acquisition and operating cost, conserve resources, and avoid circumstances that would increase manpower needs. To the extent that cost is influenced by basing location, cost will be an element in screening criteria.

The remaining criterion listed by the President concerns minimizing any adverse impacts of the system. The Department of Defense therefore has the responsibility in the screening process of minimizing environmental and socioeconomic impacts. For this reason costs should not automatically be reduced or eliminated whenever they do not contribute to military effectiveness. A careful consideration of many factors is required to determine which costs are reasonable or necessary and which should be avoided. Such careful consideration is an integral part of the continuing analyses and tradeoff studies which the Department of Defense already conducts during the system acquisition process and in the planning, programming, and budgeting proces..

SCREENING CRITERIA (1.3.2)

Based on the factors in Section 1.3.1, three screening criteria were developed: distance from the coast; distance from international borders; and compatibility with the local area and activities. The rationale for and explanation of these criteria follow.

DISTANCE FROM THE COAST. The rationale for moving inland is that distance generally reduces the effectiveness of threatening sea-based forces. For physical threats such as aircraft or missiles, added distance directly increases the time needed to reach the target, increases probable warning time, and allows more time for defensive reactions. For electromagnetic threats, power requirements which are often limited to "line-of-sight" or "ground-wave" distances, can increase in relation to distance. Line of sight and ground wave distance become particularly important in a postattack environment where the ionosphere would be saturated thereby precluding its use to reflect radio frequency (RF) signals beyond line of sight.

Examples of the importance of distance from the coast in relation to specific types of threats are given below. While they cannot be inclusive of all potential future threats, they can be used to support a judgment of reasonable distance requirements.

Submarine-launched Ballistic Missiles (SLBMs). SLBMs can threaten the M-X system while the missile is on its transporter outside a shelter unless steps are taken to ensure sufficient time to provide warning, make decisions, move to another closeby shelter, insert the missile, and close up. Current Soviet submarine patrol areas and SLBM flight times will not pose a serious problem in any of the candidate basing areas. However, deployment areas at greater distances from the coast provide greater protection against potential advances in SLBM technology or changes in Soviet submarine deployment areas by providing additional reaction time for backup mobility modes. This additional time increases operational flexibility and confidence in successful implementation.

Jamming from Sea-based Forces. Another post-attack concern is the susceptibility to jamming of the MF radio communications links to and among surviving missiles. It must be anticipated that the Soviet Union would try to disrupt communications by a combination of direct attack and electronic interference. All potential deployment areas would be vulnerable to some post-attack Soviet jamming threats. However, a greater distance between C^3 nodes and the jamming threat places the side trying to jam at more of a disadvantage and facilitates countermeasures. Because M-X internetted C^3 nodes will complicate jamming attempts, potentially effective Soviet jammers would probably be too large to deploy covertly on United States land and would require a ship or deployment area beyond the control of the United States. In the specific case of off-coast jamming threats using line-of-sight or ground-wave RF propagation, the deployment areas farther inland would be considerably less vulnerable to jamming.

Cruise Missiles. Currently, there is no projected cruise missile threat against M-X. It is nevertheless prudent to provide reasonable protection from cruise missiles launched off the coast of the United States both to facilitate responsive action and to avoid motivating the Soviets to develop and deploy such a threat.

Added distance will raise the performance requirements of the cruise missile, enhance warning probability and reaction time, and increase intercept opportunities. In addition, if the range required to strike M-X exceeds 600 km (373 mi), the cruise missiles would have to be counted under the terms of SALT II.

Exotic Sea-Based Threats. M-X in MPS will be operating well into the next century and should, therefore, be provided reasonable protection against high technology, long-range threats. Examples of such threats are radar homing missiles to suppress PMD radars during reentry of Soviet ICBM warheads, missiles with advanced sensors to attack missile transporters, and aircraft or ship-based interceptors to attack M-X during its boost-phase ascent. As with cruise missiles, added distance enhances warning, increases reaction time, and can deter Soviet development of such threats.

Potential technological advances over the next 10 to 30 years mean a boost-phase interceptor could be developed to attempt to catch the M-X missile after it is launched. However, the effective distance of a boost-phase depends strongly on the position of the interceptor relative to the M-X launch trajectory. Since M-X would probably launch northward over land, interceptors off the United States coast would be far from their optimum launch point, and their effective range would be limited to about 200 to 300 mi.

Criterion Definition. The above factors were considered in conjunction with potential protection provided by United States territorial waters and the ability to deploy United States forces in and over international waters. While firm breakpoints were not evident, general ranges of acceptability could be defined. All the above factors taken together, indicated that basing M-X 500 or more mi from the coast would preclude unnecessary introduction of significant risks and greatly facilitate responses to unforeseen threats. As distance decreased below 500 mi, risks and response difficulties increased accordingly, with concerns becoming increasingly serious between 300 to 200 mi from the coast. Deployment less than 200 mi from the coast would entail unreasonable risks and would be worthy of further consideration only if deployment further inland proved impossible. Figure A-9 depicts ranges from the coast.

DISTANCE FROM INTERNATIONAL BORDERS. The logic for deploying M-X away from borders is similar to the logic for the "distance from the coast" criterion--distance reduces vulnerabilities to unforeseen threats. Additionally, the land surrounding the M-X deployment area should be United States territory to avoid international complications in any investigation of suspicious activities and to inhibit meaningful intelligence collection. National jurisdiction over such land will provide timely control of activities that represent a danger to United States national security interests without a commitment of cooperation from foreign governments.

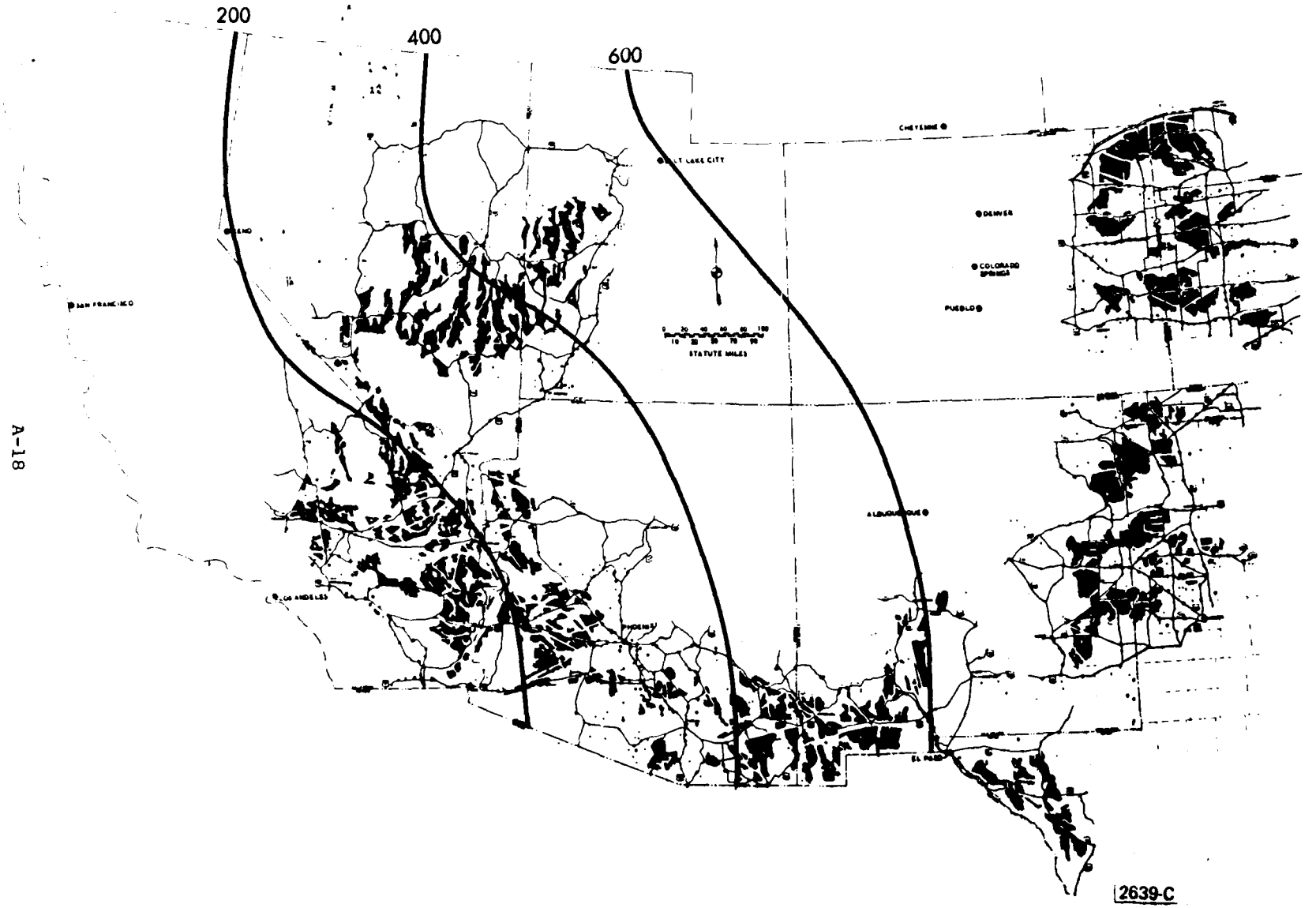

Figure A-9. Range from coastline.

Distance from non-United States territory reduces the possibility of a haven for covert activities and precludes an enemy attack on the M-X system without penetration of United States borders and flight over United States territory. Therefore, the greater the distance from borders, the greater the enemy resources required to threaten M-X and the lower the chance of success because United States detection probability and warning time will be increased and response facilitated.

Examples of how distance from international borders can reduce potential risks are given below. While these examples cannot be inclusive of all potential future threats, they can be used to support a judgment on reasonable distance requirements.

Enhancement of PLU. Because the effectiveness of M-X depends on PLU complemented by mobility, a full spectrum of countermeasures is an integral part of the M-X program. Simulators in the M-X baseline provide the basis for a successful PLU program. Continual evaluation of potential new or improved means of detecting the M-X will identify unforseen susceptibility and incorporate countermeasures. Sweeps of the deployment areas will be routinely made to uncover implanted sensors. Distance from another country's borders is especially important if M-X is to be protected from covert sensors.

Sensors generally depend on transmission of energy through the ground or through the air. Transmissions through the ground are greatly reduced by abrupt changes in geology (e.g., alluvial valley to rocky mountains) making many modest sized valleys preferred over a few large valleys or plains. Transmissions through the air are generally "line-of-sight" and depend on altitude-distance relationships.

Increased distance from another country's sovereign territory limits the effective use of either ground or line-of-sight transmissions. It would, therefore, add an element of protection during periods of temporary PLU sensitivity between development of new or improved sensor threats and deployment of countermeasures. In addition, reduced sensor effectiveness should reduce the cost and time needed to develop and deploy countermeasures. Compared to potential physical threats to M-X, sensor threats are concerns over relatively short distances. Based on an effective range of over a few miles are not currently envisioned. However, it is prudent to remove any chance that an ambiguous situation could be exploited to cast doubt on the security of survivability of the M-X force. A buffer zone of 100 to 200 mi from international borders is advisable.

Active Enemy Actions. Many of the same concerns used to develop the "distance from the coast" criterion are valid in determining reasonable "distance from the border" requirements. In time of strife, the United States could control activities within its borders but could not depend on controlling activities outside its borders. Non-United States

territory could provide potential aircraft approaches or covert deployment areas for a variety of threats against M-X; jammers, cruise missiles, threats to a potential BMD system, even boost-phase interceptors.

Concerns about sea-based threats are moderated by several factors. First and foremost, the United States currently enjoys friendly relations with its neighbors and, to the extent possible, they would oppose Soviet use of their submarines or ships as launch platforms, the size of equipment they could use without overt deployment would be limited. Third, in the case of Mexico, a boost phase interceptor would have to chase and catch an M-X missile which would be launched northward limiting the effective intercept distance to under 200 mi.

On the other hand, protection comparable to that afforded by United States territorial waters and the ability to position United States forces in and above international waters would not be available should these threats materialize.

Criterion Definition. In view of all the above factors taken together, it was considered that basing M-X more than 500 mi from an international border would preclude unnecessary introduction of significant risks and greatly facilitate responses to unforeseen threats. As distance decreases below 500 mi, risks and response difficulties increase accordingly, with concerns becoming serious between 300 to 200 mi from an international border. Deployment less than 200 mi from an international border would entail unreasonable risks and would be worthy of further consideration only if other basing areas proved impossible. Figure A-10 depicts ranges from international borders.

COMPATIBILITY WITH LOCAL AREA AND ACTIVITIES. Studies are underway to analyze the environmental and socioeconomic impact of proposed actions and develop ways to minimize adverse impacts. The reverse process is also required; namely, to assess how the local area and activities will affect military effectiveness and operational procedures.

If M-X is deployed in an area with substantial existing activities and a relatively high population density, siting actions must, to the extent possible, avoid plots of land with relatively high use and development. Since the Air Force will have to work with the local population for the life of the system, mutually supportive community relations are very important. It is Air Force policy to avoid condemning land or restricting its use except where no reasonable alternative exists.

One way to mitigate local impacts is to site around existing buildings. Such siting would either decrease or increase the spacing between shelter sites relative to baseline levels. Reducing spacing would make the shelters vulnerable to collateral damage by single Soviet

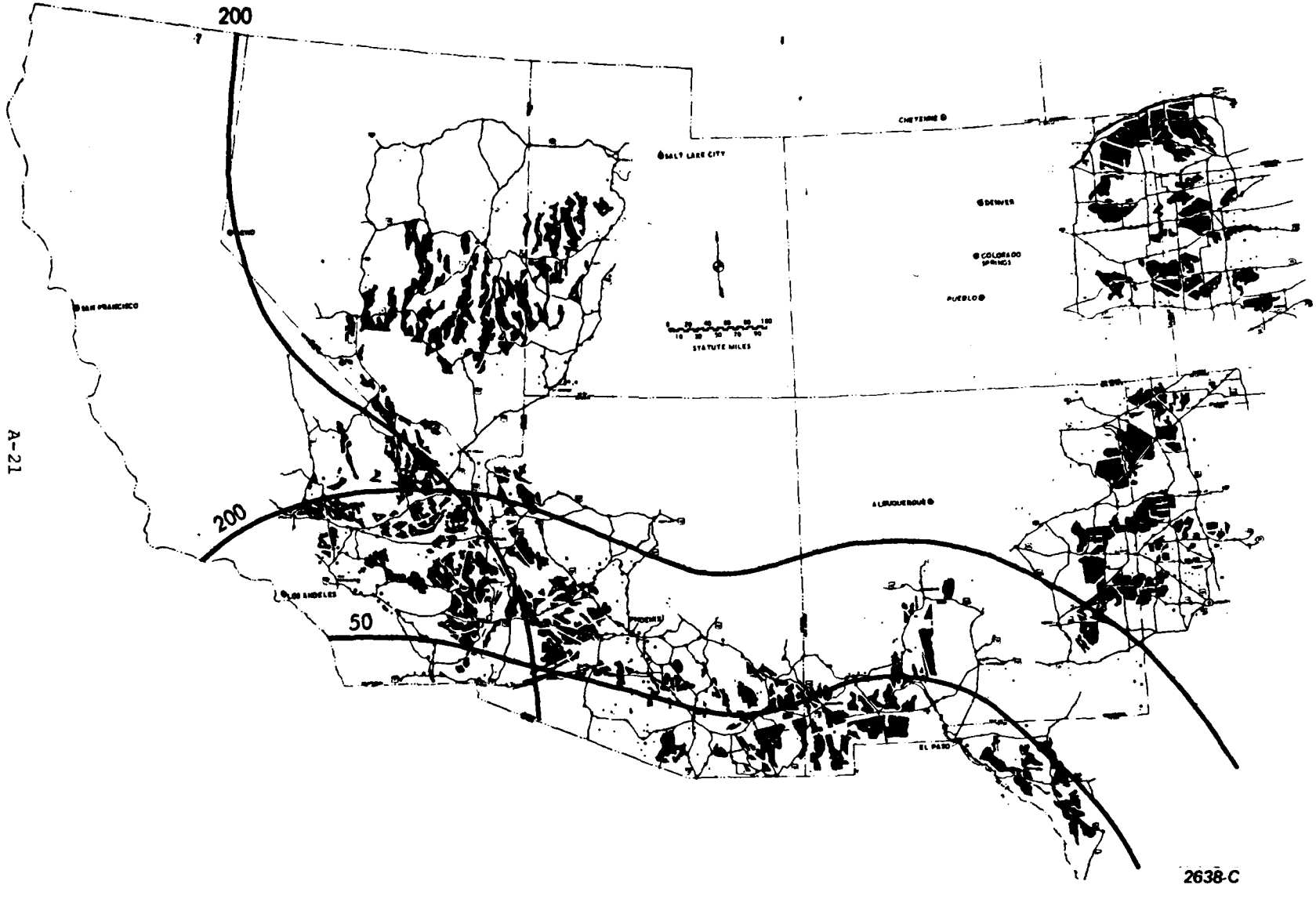

Figure A-10. Range from borders and coast.

reentry vehicles and would involve deploying shelters and building roads in a non-optimum manner. Increased distances between shelters increases the total area affected by deployment, time lines for mobility modes, manpower, and equipment requirements. Either way, the need to deploy sites around existing structures will affect acquisition and operating costs and lessen M-X effectiveness.

Impact of Land Use on M-X Operations. From the onset of the M-X program, land use has been a primary consideration. Included in this consideration are desires to minimize acquisition of land for exclusive M-X use, to maximize use of public land rather than private, and to avoid unnecessary use of productive land. Not only is careful attention to land use consistent with DOD policy and the Air Force's interpretation of Congressional intent, it also, as explained in the next two sections, enhances verification, facilitates PLU activities, and tends to minimize operational costs.

Obtaining private land, whether owned by individuals or non-federal jurisdictions, may require condemnation if owners will not voluntarily sell or if condemnation is the only means of obtaining clear title. Siting regions containing large amounts of private land are relatively undesirable because of public reaction to condemnation procedures.

Acquiring private land may entail significant cost and schedule risks. The legal requirement to pay severance damages plus the complicated process of identifying large numbers of individual tracts and owners, determining property values, making offers to buy, and, if necessary, condemning land, makes the entire procedures uncertain in terms of cost and time. The Air Force has the constitutional statutory power to take land over an individual owner's objections, but the option is extremely undesirable and is a last resort.

Public Law 96-27, dated 27 June 1979, Department of Defense Supplemental Appropriation Authorization Act 1979, Section 202 b states ". . .it is the sense of the Congress that the basing mode for the M-X missile should be restricted to location on the least productive land available that is suitable for such purpose."

The discussion in Congress indicated that the intent was to minimize acquisition of agriculturally productive land for M-X deployment. Therefore, basing areas that avoid agricultural activities are preferred. As discussed in the next two sections, this policy is also consistent with minimizing operational costs and enhances verification and PLU activities.

Verification. The open society that exists in the United States increases opportunities for the Soviet Union to verify the number of M-X missiles produced and deployed. However, M-X must still be verifiable by National Technical Means, both to set verification standards for Soviet mobile missile systems and to vitiate any Soviet

contentions the M-X is not allowable under SALT agreements. Several characteristics aid verification and will be incorporated into the M-X/MPS system.

Provisions have been made for post-deployment inspection wherein a portion of the M-X field is uncovered so the number of missiles in a defined area or cluster can be counted unambiguously. A key to this process is assurance that missiles cannot be moved out of the field selected for inspection before the inspection actually takes place. To this end, special roads into clusters will be barricaded to prevent missile "escape" without leaving obvious signs. (Means will be provided so that public and commercial vehicles, which are much smaller than a missile transporter, will be able to bypass the barricades.) Transit via other routes is normally prevented because the one-million lb transporter could not easily traverse unprepared land and would leave observable tracks in the dirt for long periods of time.

As a result, well-prepared "escape" routes, very smooth land areas, and high levels of plowing or other agricultural activities that could be used to erase unauthorized missile tracks will be incompatible with high verification standards unless normal activities are restricted during inspecting periods.

On the other hand, areas with minimum agricultural activity are highly compatible with verification standards. Furthermore, verification is enhanced if areas have little rail or heavy truck traffic to mask missile movement or provide ambiguous signals and few nearby facilities large enough to assemble, store, or hide missiles. Confidence in verification would be even further enhanced if natural barriers such as mountains can be used to isolate the deployment area from potential missile assembly facilities.

Preservation of Location Uncertainty. Location uncertainty depends in some degree on a physical security system to indicate potential espionage activity very close to the shelters. This system which includes security patrols and various sensors such as radar is defined in Appendix B of this report.

The efficiency of the security system depends on determining if activity near a shelter merits investigation. A high degree of activity would lead to an inherent increase in false alarms, increasing security force requirements, and resulting in greater manpower and operating costs.

Areas expected to have high population densities are, therefore, less operationally attractive than are areas with low densities. (Note: M-X would cause population growth in any of the candidate basing areas, but the addition of M-X would not be expected to change the relative population density ranking of each area.)

It is anticipated that periodic sweeps of the land around the shelters will be required to verify that sensors have not been surreptitiously implanted in an attempt to determine missile locations. Such sweeps would be most compatible with undeveloped land and range land. Farmers may well object to people walking through their fields, and plowed fields make it harder to detect sensor implantations. Sweeps would not be compatible with extensive agricultural activities which in themselves disturb the land.

Criterion. Because the "compatibility with local area and activities" criterion contains a number of factors, this criterion is difficult to define in a straightforward manner. However, compatibility tends to depend on three highly correlated characteristics. Areas with very low rural populations, low activity levels, and primarily undeveloped land should be highly compatible with the M-X system and involve no significant operational problems. Areas with a modest rural population, low-to-medium activity levels, and primarily undeveloped land or rangeland are considered reasonable deployment areas; problems would increase, but could be solved with reasonable measures. Areas with high rural populations, high activity levels, or which are predominantly agricultural, are considered unreasonable basing areas.

APPLICATION OF CRITERIA TO CANDIDATE BASING AREAS (1.3.3)

This section provides the results of an evaluation of each of the six candidate basing areas using factors and criteria, the results of which are summarized in Table A-1.

Nevada/Utah (Great Basin) (1.3.3.1)

DESCRIPTION. The suitable land in this area (Figure A-2) is mostly public land composed of valleys separated by mountains. Most of this acreage is rangeland with relatively few livestock, due to sparse vegetation. The land is made up primarily of desert shrubland with some areas containing small trees and brush.

The rural population in Nevada and Utah is very low, compared to other areas, with most rural residents in small towns. Inhabitants in outlying areas are widely separated except along cultivated river valleys. The Great Basin area contains no major population centers internally, but several are located south, east, and northwest, accessible by major highways. Siting alternatives removed from major urban centers are possible.

EVALUATION. The area is located 300 to 500 mi from the coast (rated as having reasonable risks) and 300 to 500 mi from international borders (reasonable risks). Compatibility with M-X is rated high.

Table A-1. Evaluation of candidate basing areas.

CANDIDATE AREA	RISK DUE TO DISTANCE FROM COAST	RISK DUE TO DISTANCE FROM BORDER	COMPATIBILITY WITH LOCAL AREAS AND ACTIVITIES	SELECTED FOR FURTHER STUDY
Nevada/Utah	Reasonable	Not significant	High	Yes
California	Unreasonable	Unreasonable in Southern half	Reasonable	No
W. Arizona	Reasonable	Unreasonable	Reasonable	No
Arizona-New Mexico-SW Texas	Reasonable	Unreasonable	Reasonable	No
West Texas/ New Mexico	Not Significant	Reasonable	Reasonable	Yes
Colorado-Kansas-Nebraska	Not Significant	Not significant	Unreasonable	No

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Minimum acquisition of private land is anticipated, including transportation right-of-ways in narrow valleys. Roads built for M-X would be available for local use. M-X in MPS would be compatible with other productive land uses and no significant agricultural impact is anticipated.

Due to the very low rural population and activity levels, basing of M-X in the area would require very few siting actions that would increase overall system costs. For the same reasons, the area is highly amenable to unambiguous verification and efficient PLU measures.

Overall, the Nevada/Utah area was considered a reasonable basing area for M-X in MPS, and in-depth environmental analyses have been directed for this area.

California (Mojave Desert) (1.3.3.2)

DESCRIPTION. The suitable land in this area (Figure A-1) is also mostly public land composed of valleys separated by mountains. Most of the area has relatively little rangeland or agriculture, although both activities are present in the western portions of the area. The non-cultivated areas are primarily desert shrubland. Overall rural population is significantly greater than the Nevada/Utah area, but still reasonably low. Population in the eastern portion of this area is comparable to the Nevada/Utah area.

The area is close to the greater Los Angeles population center and to Las Vegas, but is isolated from both by mountains. Major transportation corridors cross these barriers and transit the candidate area. These corridors provide access to the area for the large numbers of people from the Southern California area, and the M-X roads would improve access to off-highway land. It is expected that activity in some parts of the deployment area, primarily those portions with recreational attractions, could be high.

EVALUATION. The area is located within 200 mi of the coast (rated as having unreasonable risks) and stretches between about 50 to 300 mi from the United States--Mexican border. (Over 60 percent of the area is rated as having unreasonable risks.)

Compatibility with M-X is rated as reasonable although access for visitors from the greater Los Angeles area via major highways could lead to verification and PLU difficulties in some parts of the deployment area. (Parts of the western portion of the area would not rate as reasonable, but there is sufficient land in the overall area to avoid them.)

Overall, due primarily to the risks entailed in deployment within 200 mi of the coast, this area was not considered a reasonable alternative and was not selected for further study.

Western Arizona (Sonoran Desert) (1.3.3.3)

DESCRIPTION. This area is 90 percent public land (Figure A-4) made up of valleys separated by mountains. It is composed of desert shrubland used for grazing. Rural population is within reasonable limits. The area is easily accessible from Yuma, Phoenix, and Tucson via major highways and may be expected to attract visitors for recreational purposes.

EVALUATION. The majority of this area is located 200-300 mi from the coast (reasonable risk), but it is within 200 mi of the United States-Mexican border (unreasonable risk).

Compatibility with M-X is well within reasonable limits, although somewhat lower population and activity levels would be more desirable.

Overall, however, due to the risks entailed in deployment within 200 mi of an international border, this area was not considered a reasonable alternative and was not selected for further study.

Arizona-New Mexico-SW Texas (Highlands) (1.3.3.4)

DESCRIPTION. The suitable land in this area (Figure A-5) is more than 50 percent privately owned. It is composed of large valleys separated by mountains and is primarily semi-arid grassland and desert shrubland used for rangeland.

The rural population is reasonably low, but the area is accessible from Tucson, Arizona, and El Paso, Texas, via major highway.

EVALUATION. The area is located almost 400 to more than 600 mi from the coast (reasonable risks in western portion, no significant risks in eastern), but is less than 200 mi from the United States-Mexican border (unreasonable risk). Compatibility with M-X is considered reasonable.

The large percentage of privately held land would undoubtedly result in deployment of some shelters on land that is now private. To minimize the impact, siting actions would be required that would tend to increase M-X costs. Nonetheless, no insurmountable difficulties or impacts are anticipated that would cause an unreasonable rating on compatibility for this area.

Overall, due primarily to the risk entailed in deployment within 200 mi of an international border, this area was not considered a reasonable alternative and was not selected for further study.

West Texas/New Mexico (Southern High Plains) (1.3.3.5)

DESCRIPTION. The suitable land (Figure A-6) in this area is 95 percent privately owned. It is composed primarily of relatively smooth plains, used for rangeland and crops such as wheat, cotton, barley, and rye.

The rural population is comparable to the other areas with the exception of Nevada/Utah. The northern portion of this area is not as densely populated, nor does it contain as extensive a highway and secondary road network as the southern portion. However, taken as a whole, this area contains the greatest resident population of any of the candidate areas. The region is not likely to draw large numbers of visitors seeking recreation.

EVALUATION. This area is located over 500 mi from the coast (no significant risks) and over 200 mi from the United States-Mexican border (reasonable risks). Compatibility with M-X is rated as reasonable, although there are some concerns.

Deployment would require private land acquisitions and land use restrictions as well as siting actions to minimize impacts on current activities. Sufficient rangeland suitable for M-X deployment apparently exists so that acquisition of agricultural land can be largely avoided. However, detailed studies will be required to determine the specific impact on agricultural productive land.

The rural population is within reasonable limits. Therefore, if agricultural land can be largely avoided, the verification and PLU operations affected by people and agricultural activities should not entail unreasonable risks. In fact, deployment of M-X on private land may enhance PLU because landowners may restrict transient traffic.

Verification, however, may suffer if deployment is in a plains area since the natural clustering advantage of valleys and mountains will be lost, and high confidence in post deployment inspection may require construction of artificial barriers.

Overall, while some potential risks and problems were identified, this area was considered a reasonable M-X basing area alternative. Therefore, in-depth environmental analysis has been directed for this area.

Colorado/Kansas/Nebraska (Central High Plains) (1.3.3.6)

DESCRIPTION. The suitable land in this area (Figure A-7) is almost completely privately owned. It is composed of plains land, used predominantly for raising crops such as wheat, sorghums, rye, and barley.

The rural population is comparable to the other candidate areas with the exception of Nevada/Utah. As determined by county figures, the population is evenly distributed. Although no major population centers are within or adjacent to the deployment area, a number of medium-sized towns and marketing centers are spread throughout the suitable lands, and the area is accessible by major highways. The area is not expected to draw a large number of visitors.

EVALUATION. This area is located over 500 mi from the coast (no significant risks) and over 500 mi from an international border (no significant risks). However, as explained below, the local area and its activities are not reasonably compatible with M-X.

Basing in this area would be contrary to Congressional intent that M-X should be restricted to the least productive land available. Because the system would have to be deployed on cultivated land, impacts on agriculturally productive land could not be avoided--even with extensive siting actions to avoid acquisition of land with houses or facilities large enough to assemble or hide missiles. (Such facilities would be contrary to verification principles.)

Operational costs would be increased by such siting actions, verification would be hampered by both the lack of natural valley clustering and ambiguous activities and facilities, and confidence in PLU with its security system and periodic sweeps would be more difficult and costly to maintain in a highly cultivated and active area.

An additional screening factor became evident during the evaluation of the Colorado-Kansas-Nebraska area. Because the prime system for M-X post-attack C^3 will rely on ALCC aircraft operating within 200 mi of the M-X field, other nearby targets were evaluated to assess how an attack on them would affect M-X operations.

Of the six potential basing areas, this area has, by far, the greatest number of high-value targets that the Soviets would most likely attack, including an adjacent Minuteman field, a Titan II field, NORAD Headquarters in Colorado Springs, and SAC Headquarters at Offutt AFB in Nebraska.

The large number of other targets near the potential M-X field will both constrain C^3 operations by limiting ALCC operating areas (or ground mobile control center operating areas) and provide the Soviets with a no-cost opportunity to reduce United States ICBM effectiveness through collateral damage effects. In view of the problems caused by other high-value targets in the area, the Colorado-Kansas-Nebraska area was judged to be the least operationally suitable of the potential basing areas.

For these reasons, this area was found to be an unreasonable alternative and worthy of consideration only if other basing areas prove to be impossible.

Summary Conclusions (1.3.3.7)

In general terms, operational difficulties and risks to M-X military effectiveness will be minimized by three basing provisions: deployment at a reasonable distance from the coast, deployment at reasonable distance from international borders, and deployment in an area where M-X in MPS would be compatible with existing activities.

The California area was not selected for in-depth environmental analysis because it did not provide sufficient distance from the coast. The Western Arizona and Arizona-New Mexico-SW Texas areas were not selected for further study due to their proximity to an international border. The Colorado-Kansas-Nebraska area was not selected for further study because of incompatibility with M-X deployment and operational considerations.

In following the "horseshoe" pattern of suitable area from Nevada/Utah, through California, Arizona, New Mexico, and Texas, to the Colorado-Kansas-Nebraska area, three trends were evident: (1) the percentage of private land tends to increase, (2) lands tend to be predominately agricultural, and (3) population becomes relatively evenly distributed.

All three trends are indicative of increasing military and operational problems associated with M-X deployment. The problems can be overcome, but the difficulties will increase as one moves around the "horseshoe" until, in the Colorado-Kansas-Nebraska area, the concerns, combined with problems due to other nearby high-value targets, were sufficiently serious to decide not to select it for further study.

The two remaining areas, Nevada/Utah and West Texas/New Mexico, were both considered reasonable alternatives, although information collected to date indicated that Nevada/Utah is the preferred area for M-X in MPS.

APPENDIX B

DESIGNATED DEPLOYMENT AREA FACILITIES (1.0)

The designated deployment area (DDA) is the land on which the major M-X system facilities will be constructed and the system elements operated. These facilities include 4,600 horizontal shelters (grouped in clusters of 23), 200 missile/launcher transport vehicles, 200 cluster maintenance facilities (one per cluster), cluster roads, the major portion of a special interconnecting road (the designated transportation network or DTN), area support centers (3-6), and earth barriers (200, each restricting a missile to its assigned cluster to aid in Strategic Arms Limitation Treaty (SALT) verification). Additionally, the DDA will contain major portions of an electrical power distribution system, physical security system, buried antennas, and a buried fiber optic command, control, and communications network. The major system elements include 200 missile/launchers and 200 transporters.

CLUSTERS (1.1)

A cluster is a group of 23 concrete structures (horizontal shelters), each capable of housing and protecting a missile launcher, connected by a cluster road, including a cluster maintenance facility (CMF) (Figure B-1). Each cluster will contain only one missile. The pattern, spacing, and hardness of the shelters ensure survivability against attacks. The preferred pattern is hexagonal with an average spacing of 5,200 ft (but not less than 5,000 ft) between shelters (Figure B-2A). Existing roads may make it necessary to use an alternative pattern, called a "grid". In the latter case, the pattern is no longer an equal-sided hexagon (Figure B-2B).

Different amounts of suitable area are required with the two patterns. Under ideal conditions, with the system deployed in a single, continuous area, approximately 1.25 sq mi of suitable area would be required to site one shelter in the regular hexagonal pattern, or approximately 5,800 sq mi for the entire system. The requirement for the grid pattern is nearly 20 percent larger, or approximately 6,900 sq mi for the entire system. Neither of these minimum areas is achievable under real-world conditions, since suitable area occurs in numerous isolated parcels. A given parcel will almost never accommodate an exact number of clusters. Consequently, some potential shelter sites are unusable in each separate deployment parcel, and more than the theoretical amount of suitable area will be required. For planning, 42.5 sq mi has been allocated for siting a cluster, of 8,500 sq mi for the entire system.

PROTECTIVE SHELTERS. The protective shelter (shown in Figure B-1) is designed to house, protect, and conceal the missile/launcher. The shelter proper is a reinforced-concrete, steel-lined cylinder buried under 5 ft of earth. Its concrete-and-steel door is accessible by a downramp and apron to provide access by the transporter vehicle. The transporter

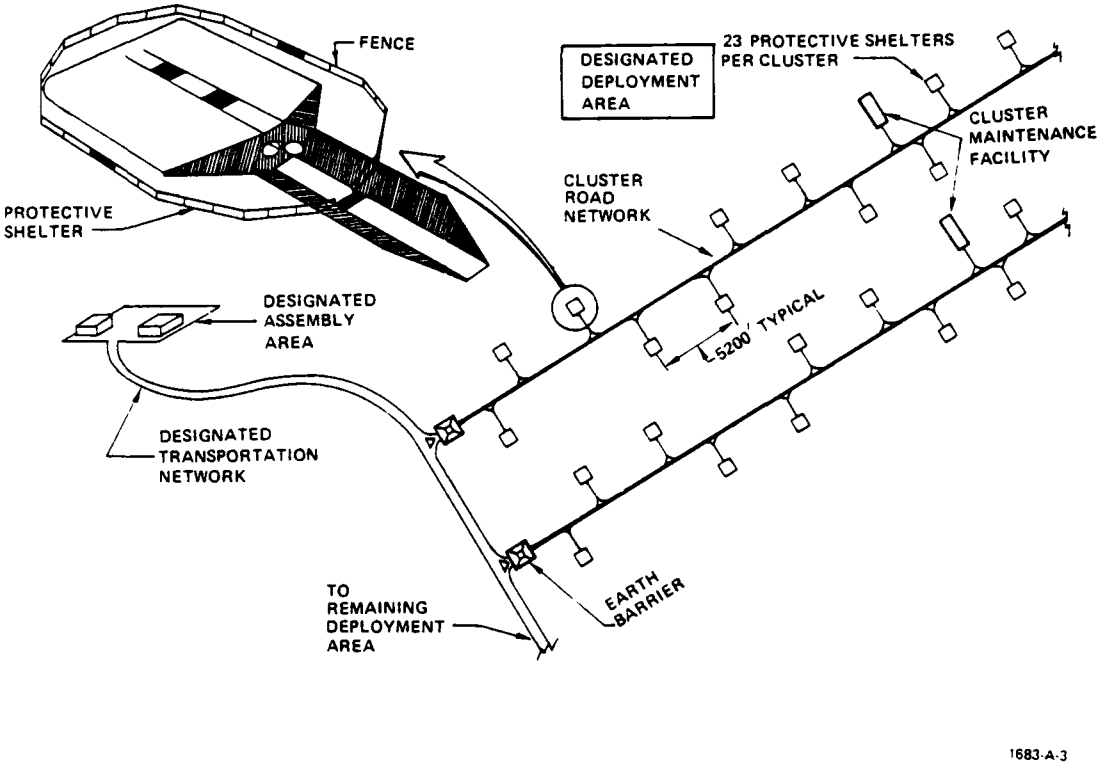

Figure 1.2.2.1-1. Conceptual cluster layout.

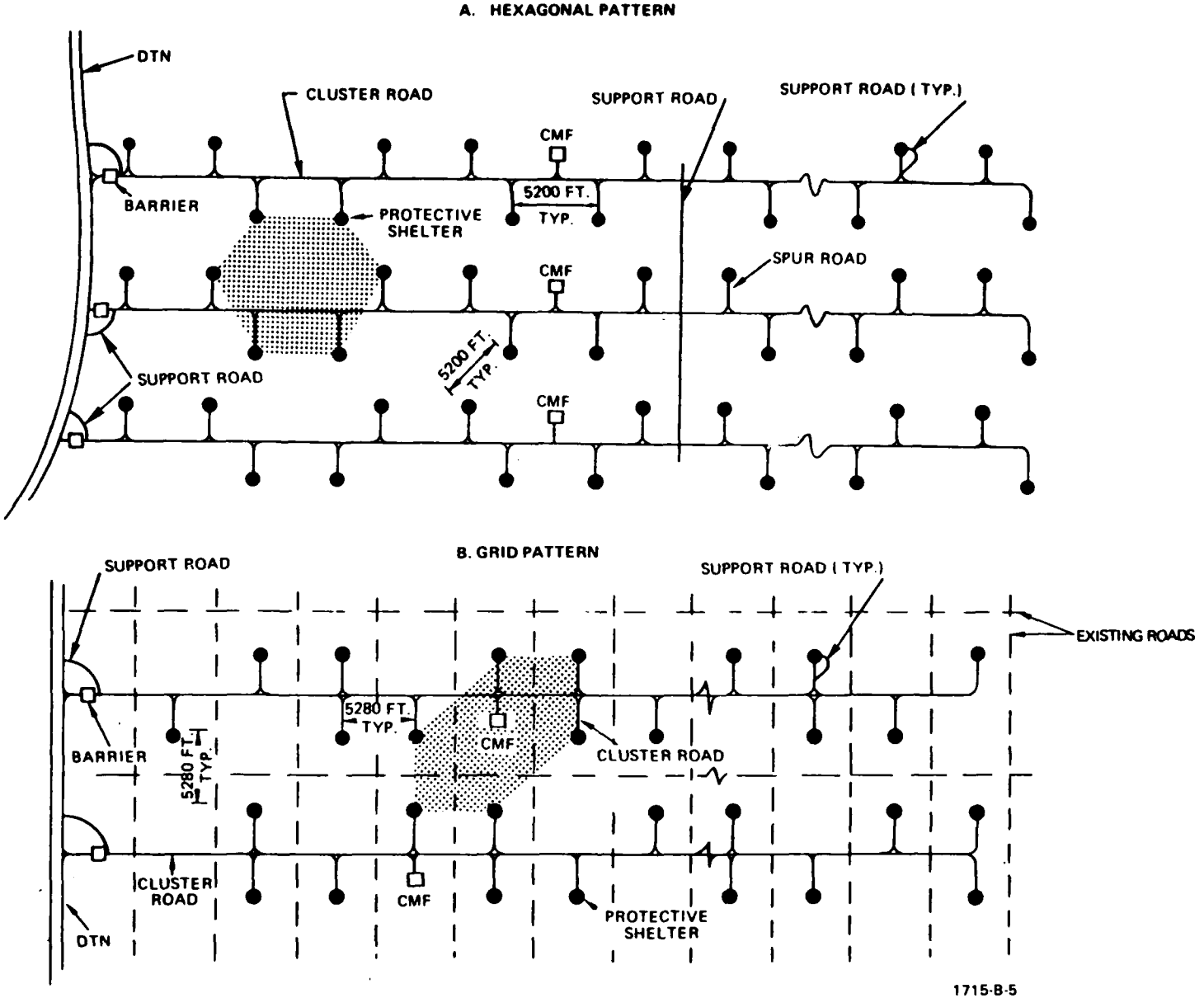

Figure B-2. Hexagonal and grid cluster patterns.

visits each shelter in a cluster to emplace a missile/launcher in one, leaving simulators in the others to preclude detection of the shelter that contains the missile.

The access apron is approximately 25 ft below the surrounding surface, and must be excavated to somewhat greater depths to permit surfacing. The necessary excavation depth, and the need for subsequent drainage during wet weather, in part dictate the depth to rock and water criteria established for screening. Both dewatering and blasting of rock are expensive construction procedures. Also, continued pumping is not desirable during operation, so that a reasonable factor of safety with respect to water depth is desirable. Additionally, susceptibility of the protective structure to damage during an attack decreases with increasing depth to rock and water, making lesser depths than those used in screeing undesirable.

The amount of excavation required, and consequently both the amount of disturbance and cost associated with shelter construction increases with increased slope of the land surface. Also, the gradeability of the transporter must be increased (or connecting roads made longer to avoid runs directly up-slope) as shelters are emplaced on steeper and steeper slopes. This factor led to the 10 percent grade exclusion used in screening. Emplacement on grades of no more than 5 percent is planned wherever feasible in the actual deployment area.

The material excavated from the downramp and apron area will be used to form the berm over the shelter, so neither borrow pits not spoils piles will be required for this purpose. Materials sources will be required for the aggregate used to make the concrete for the shelter, however. This factor does not have a strong influence on shelter siting, but will influence the siting of construction resource areas.

CLUSTER AND SUPPORT ROADS. Cluster and support roads are shown in Figure B-3. Cluster roads connect each shelter and the cluster maintenance facility within a cluster. Cluster roads consist of a stabilized base material treated with a dust suppressant (palliative) and are 21 to 30 ft wide with 5 ft shoulders. The maximum grade for these cluster roads is 5 percent, with a minimum turn radius of about 400 ft. The transporter operates exclusively within the cluster and is confined in it by a barrier over the access road.

Both the terrain slope and roughness criteria used in screening were influenced by the need to provide mobility for the system, either along roads or in buried trenches. Steep slopes influence transporter capabilities, as noted previously. Rolling terrain with a predominance of slopes over 5 percent increases road lengths, environmental disturbances, and costs. The presence of numerous deeply incised drainages increases the need for culverts and bridges, with substantial increases in initial and maintenance costs, and the possibility of breaks in the internal transportation system in the affected clusters as a result of severe weather.

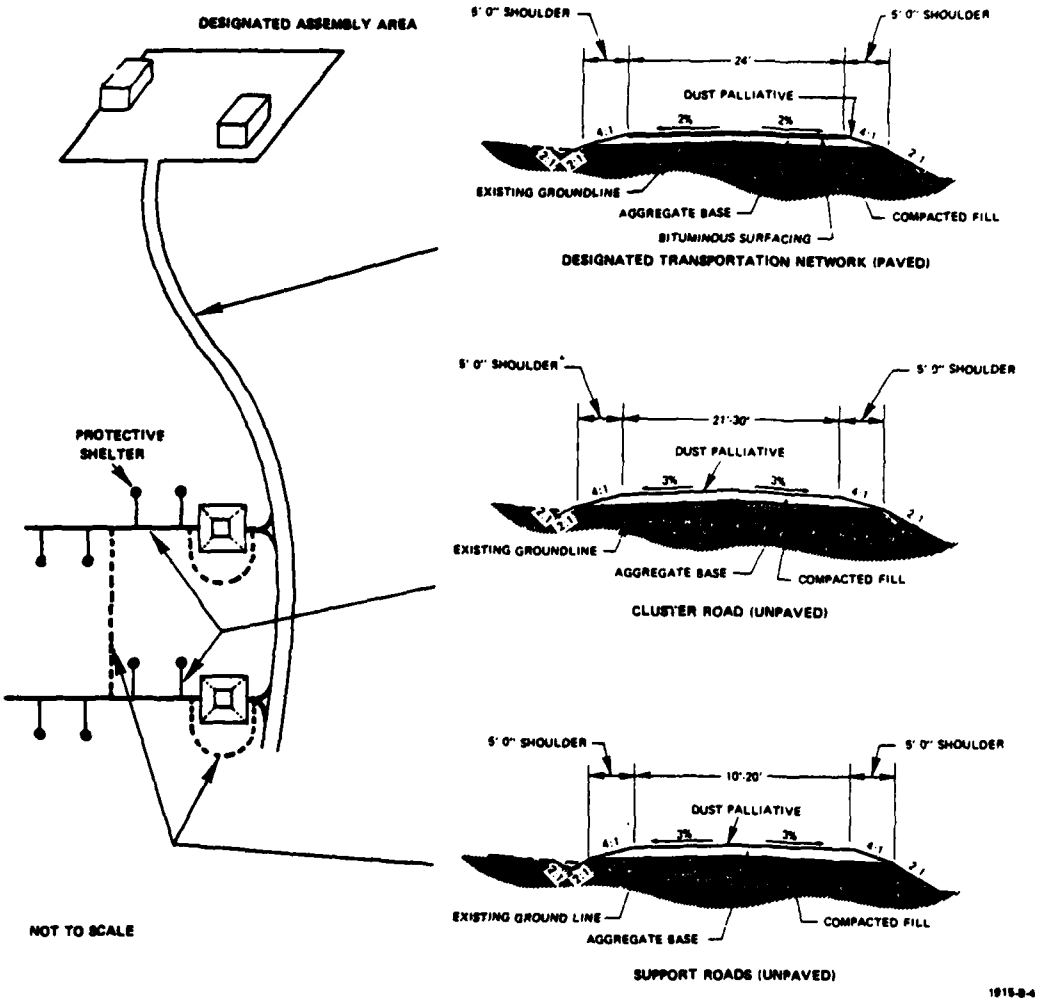

Figure 1.2.2.1-3. Roads.

Support roads provide access to other deployment area facilities such as remote surveillance (radar) sites and power distribution centers and for inter-cluster security vehicle movements. Support roads are made of stabilized base materials treated with dust palliative. They are 10 to 20 ft wide with 5 ft shoulders. The missile transporter is incapable of operation on the support roads. This ensures that the missile/launcher cannot be moved between clusters.

Materials will generally be required from borrow areas to obtain the base materials for cluster roads. No borrowed material is expected to be required for support roads.

BARRIERS. SALT verification requires confinement of each missile/launcher to a single cluster, or group of 23 shelters. Confinement is provided by a barrier which consists of a 60 ft x 50 ft earthen berm piled 10 ft high. Sufficient material is available from shelter construction to build the barriers without importation of materials from borrow pits.

CLUSTER MAINTENANCE FACILITY. Each cluster will contain a cluster maintenance facility (CMF) where transporter, launcher, and minor missile repairs will be performed. The requirement for a CMF does not influence locational decisions in the DDA. For further details, see Chapter 1 of the EIS.

REMOTE SURVEILLANCE SITES. Remote surveillance sites (RSSs) provide radar coverage of the cluster areas to detect and track vehicles and low-flying aircraft. Rolling or rough terrain would make siting of the RSS system, which is needed for physical security, difficult. (The radar to be used is essentially a "line-of'sight" system.) The terrain characteristics criteria used in screening consequently are also related in part to the needs of the surveillance system.

AREA SUPPORT CENTERS (1.2)

Operations, maintenance, and security support for the system are required throughout the DDA, which could be dispersed over about 12,000 sq mi.

Services could be provided from two or more operating bases with permanently assigned personnel; however, detailed studies by the Air Force's Strategic Air Command (SAC), which will operate and maintain the system, have shown that more than two operating bases is not desirable because of operational considerations, excessive manpower requirements, and cost.

In addition to the two operating bases planned, three to six area support centers (ASCs) will be sited within the designated deployment area. Area support centers will provide facilities for equipment storage and repair, security control, maintenance dispatch, helicopter

transport and maintenance; and other services necessary to support the system in the field. The area support centers will be located along the designated transportation network to provide a secure temporary parking area for missiles in transit. Area support centers will be sited so that any protective shelter within their area of responsibility is not more than about 65 air mi away, to allow security forces to arrive via helicopter at any threatened area within 30 minutes. Additionally, maintenance forces will not be required to travel more than 90 ground mi one-way, so that they can complete their tasks in a single work shift, including travel time.

A typical area support center is expected to require a 55-acre site.

Although area support centers are essential facilities within the designated deployment area, they do not, of themselves, influence its boundaries. Rather, the locations of clusters, designated transportation network, and existing communities that can provide a civilian workforce influence ASC siting.

DESIGNATED TRANSPORTATION NETWORK (1.3)

The designated transportation network (DTN) is a network of paved roads that connects the missile/launcher assembly area at the first operating base with each cluster (see Figure B-3). The system is designed so that missiles can be moved only along the DTN, allowing observation of missile movements by satellite.

The area used for the designated deployment area is influenced in part by the requirements for the DTN. A grade of 7 percent (4.0 degrees) is considered to be the maximum feasible for this road, which makes access to some otherwise suitable areas infeasible. Additionally, the cost of this special road makes it economically unjustified to access small deployment parcels that would require a substantial length of DTN to service.

OTHER FACILITIES (1.4)

Facilities in addition to those listed above must be sited in the designated deployment area to support operation of the system; e.g., electrical power networks and standby power systems, and command, control, and communications elements. These facilities do not influence selection of the DDA boundaries and are not described here. Descriptions are provided in Chapter 1 of the EIS.

APPENDIX C

1.0 OPERATING BASE FACILITIES

AIRFIELD (1.1)

Provisions will be made at each OB site for a 12,000 ft airfield runway with parallel and cross taxiways. Flightline facilities for aircraft operations and maintenance will include aircraft hangars, base operations, command post, control tower, aircraft maintenance and testing, weather, fuels storage and dispensing, etc.

WORKCENTER (1.2)

The workcenter includes administrative functions such as headquarters staff facilities, personnel, security police, social actions, etc.; support functions such as base civil engineering (for facility maintenance, repair, operation), vehicle operations and maintenance, supply, communications, supply administration and warehousing, etc.

COMMUNITY CENTER (1.3)

The community center includes facilities such as the commissary, exchange facilities, library, theater, chapel, hospital, post office, bank, credit union, etc.

NEIGHBORHOOD CENTER (1.4)

A neighborhood center may be included to provide neighborhood services to family housing areas. They could include an elementary school, youth center, youth oriented recreation areas, base exchange branch, chapel, etc.

RECREATION (1.5)

Facilities will be provided for personnel recreation. They could include athletic fields, gymnasium, swimming pools, bowling center, hobby shops, golf course, officers, NCO and airmen open mess.

HOUSING (1.6)

Includes family housing, unaccompanied personnel quarters, visiting/temporary quarters, etc. Housing units are to be clustered to reduce land requirements within each neighborhood or housing area.

DESIGNATED ASSEMBLY AREA (1.7)

The designated assembly area contains, within approximately 1,950 fenced acres, technical facilities required for missile/canister/launcher final assembly and associated storage and maintenance facilities.

Once assembled, these components are transported to the deployment area on a special transport vehicle over the DTN. Missiles must be returned to the DAA for major repair.

The DAA ordnance storage and reentry system assembly/storage areas will comply with applicable safety requirements.

If full system deployment in a single area is selected, the DAA will be located at the first operating base only. If the system is split between two deployment areas (called split basing), each deployment area will have an operating base, and each of these operating bases will have a DAA.

ASSEMBLY AND CHECKOUT CONTRACTOR SUPPORT AREA (1.8)

A contractor support area (CSA) in the DAA provides facilities required by M-X system contractors. The CSA could include an office building; a vehicle maintenance shop; a rail staging area; storage areas and buildings; shops and utilities.

OPERATIONAL BASE TEST SITE AND TRAINING FACILITIES (1.9)

The operational base test site (OBTS) will contain DDA prototype facilities for weapon system test and evaluation. The OBTS will be close to the DAA and located in terrain similar to that of operational clusters.

Some of the facilities within the OBTS are: a road and utility network; horizontal shelter sites that stimulate a portion of an operational cluster; a surveillance site; a test support building; and a cluster maintenance facility, a barrier, and a simulated DTN. These facilities are to be used for engineering development and are not intended to be used for training purposes.

OPERATIONS CONTROL CENTER (1.10)

The operations control center is the nerve center for M-X operations. It combines supervision, missile launch, maintenance and security control, and other minor functions into one facility.

CONTSTRUCTION CONTRACTORS' MARSHALLING YARD (1.11)

An area would be provided to the construction contractor as a marshalling yard for the bulk of construction materials and equipment. This could include office facilities, storage areas and facilities, maintenance shops, etc.

LIFE SUPPORT AREA (1.12)

An area would be provided to the contractor for facilities necessary to supply contractor personnel. This could include housing, dining facilities, medical facilities, administration, shopping, recreation, etc.

RAILSPURS (1.13)

Each operating base would have railspur connections to the commercial railroad system in the area. They would be used to support construction, and subsequently for delivery of general supplied and missile components (at the DAA only).

DEPOT (1.14)

The M-X weapon system will have three levels of maintenance; organizational, intermediate, and depot. More highly skilled personnel and/or more complex equipment are required at each successive level. The least complex tasks (e.g., simple replacement of a known component) will generally be performed in the field and most complex at the depot. Intermediate level maintenance will be performed at the DAA or OB. Depot level maintenance will be performed at Air Force Logistics Command installations, by contractors, and at M-X operating bases.

Logistics Command depots for Minuteman and Titan ICBM systems are at Hill AFB (Ogden, Utah), McClellan AFB (Sacramento, California), Kelly AFB (San Antonio, Texas), Tinker AFB (Oklahoma City, Oklahoma), Newark AFB (Newark, Ohio), Kirtland AFB (Alburquerque, New Mexico), and Robins AFB (Robins, Georgia). These installations could be used for M-X use.

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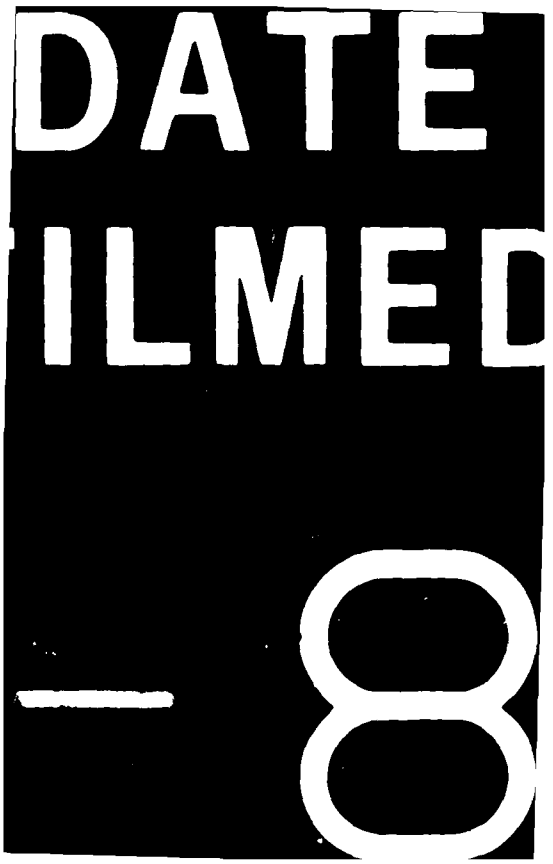
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